412.

SUPREME COURT OF THE UNITED STATES.

No. 82.

JAMES STIMPSON, PLAINTIFF IN ERROR,

vs.

THE WEST CHESTER RAILROAD COMPANY.

IN ERROR TO THE CIRCUIT COURT OF THE UNITED STATES FOR EAST PENNSYLVANIA.

INDEX.

	Original.	Print.
Writ of error	1	2
Citation	2	2
Declaration	3	3
Plea and issue	19	10
Jury sworn	20	10
Bill of exceptions	21	11
Exhibits referred to in bill of exceptions	65	31
Verdict of jury	105	50
Judgment	105	50
Clerk's certificate	105	50

J. & G. S. GIDEON, printers.

UNITED STATES, *eastern district of Pennsylvania, sct:*

[SEAL.] The President of the United States to the judges of the circuit court of the United States, in and for the eastern district of Pennsylvania, in the third circuit, greeting:

Because in the record and process, and also in the rendering of judgment, in a suit before you, between James Stimpson, plaintiff, and the West Chester Railroad Company, defendants, in a plea of trespass on the case, a manifest error has intervened, to the great damage of the said plaintiff, as in his complaint has been stated; and as it is just and proper that the error, if any there be, should be corrected in due manner, and that full and speedy justice should be done to the parties aforesaid, in this behalf: You are hereby commanded, that if judgment thereof be given, then, under your seal, you do, distinctly and openly, send the record and process in the suit aforesaid, with all things concerning them, and this writ; so that you have the same before the chief justice and the associate justices of the Supreme Court of the United States, on the second Monday in January next, at the city of Washington, being the seat of [the] National Government, that the record and process aforesaid being inspected, they may cause to be done thereupon, what of right ought to be done.

Witness the honorable Roger B. Taney, chief justice of the Supreme Court of the United States, at Philadelphia, this third day of April, A. D. one thousand eight hundred and forty-three, and in year of the independence of the said United States.

FRA. HOPKINSON, *Clk. circuit ct.*

Allowed by ARCH'D RANDALL.

UNITED STATES, *eastern district of Pennsylvania, sct:*

To the West Chester Railroad Company:

Whereas, by a writ of error, issuing out of the Supreme Court of the United States, directed to the judges of the circuit court of the United States, holden in and for the eastern district of Pennsylvania, in the third circuit, wherein James Stimpson is the plaintiff, the said judges are directed to send the record and process of a certain suit, with all things concerning them, so that the same may be had before the chief justice and the associate justices of the Supreme Court of the United States, on the second Monday in January next, at the city of Washington, being the seat of the National Government, in which suit the said James Stimpson is the original plaintiff, and you, the said West Chester Railroad Company, are the original defendants, in a plea of trespass on the case; that the record and process aforesaid being inspected, they, the said chief

justice and associate justices, may cause to be done thereupon, what of right ought to be done; and the said James Stimpson having made an assignment of errors, and given good and sufficient security that the plaintiff in error shall well and truly prosecute his said writ of error to effect, and answer all such costs as, upon an affirmance of the judgment of the said circuit court, may be adjudged to the defendants in error, you are hereby cited to appear (if you see cause) at the said Supreme Court, at the time and place aforesaid, to answer to the said writ of error, and the errors assigned by the said plaintiff in error.

Given under my hand and seal, this third day of April, one thousand eight hundred and forty-three.

ARCH'D RANDALL.

Please before the honorable the judges of the circuit court of the United States, in and for the eastern district of Pennsylvania, in the third circuit, at Philadelphia, of October session, A. D. 1840.

It is thus contained:

The Westchester Railroad Company were attached to answer James Stimpson of a plea of trespass on the case, and so forth.

Whereupon, the said plaintiff, by J. R. Ingersoll, his attorney, complains, for that the said plaintiff was the true and original inventor of a certain new and useful improvement, in the letters patent hereinafter mentioned [and] described, being an improvement in the mode of turning short curves on railroads, which was not known or used before the time of his first application for a patent, as hereinafter mentioned; and the said plaintiff being a citizen of the United States, and, as aforesaid, the true and original inventor thereof, on the twenty-third day of August, one thousand eight hundred and thirty-one, made application in due and proper form of law to the Secretary of State of the United States, for letters patent for the same, and made oath that he verily believed that he was the true inventor or discoverer of the said improvement, and paid into the Treasury of the United States the sum of thirty dollars, and delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent might be granted for that purpose; and the Secretary of State of the United States thereupon caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the day and year aforesaid, under the seal of the United States, and duly tested by the President of the United States, according to the form of the statute in such case made and provided, wherein and whereby was granted, according to law, to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement,

a description whereof was given in the words of the said James Stimpson himself, in a schedule thereto annexed, and was made a part of the said letters patent.

And afterwards, to wit, the twenty-sixth day of September, one thousand eight hundred and thirty-five, the said letters patent were cancelled in due form of law on account of a defective specification, and the Secretary of State of the United States caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the said twenty-sixth day of September, one thousand eight hundred and thirty-five, under the seal of the United States, and duly tested by the President of the United States, according to the form of the statute in such case made and provided, whereby and wherein was granted to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof was there given in the words of the said plaintiff himself, in the schedule annexed to the said letters patent, and was made a part thereof, as by the said last mentioned letters patent, in court to be here produced, reference being thereunto had, will fully appear. And the said plaintiff says, that he, the said plaintiff, did always, from the time of making and granting the said last mentioned letters patent as aforesaid, exercise and enjoy the said right and liberty to the day of the commencement of this suit, to his great profit and advantage, to wit, at the district aforesaid, and in that respect has made, constructed, and used, and vended to others to be used, the said improvement, to his great profit and advantage, to wit, at the district aforesaid.

Yet the said defendants, well knowing the premises, but contriving and wrongfully and injuriously intending to injure the plaintiff, and to deprive him of the profits and advantages which he might, and otherwise would, have derived and acquired from the exclusive making, constructing, using, and vending to others to be used, the said new and useful improvement, after the making of the said last mentioned letters patent, to wit, the first day of April, one thousand eight hundred and thirty-nine, at the district aforesaid, and at divers other days and times between that day and the commencement of this suit, did make and construct, and having made and constructed, did use the new and useful improvement aforesaid, unlawfully and unjustly, without the consent and against the will of the said plaintiff, in breach of the letters patent aforesaid, and in violation and infringement of the right, and privilege, and liberty, so as aforesaid granted to the plaintiff, and contrary to the form and effect of the statute in such case made and provided, whereby the said plaintiff hath been, and is, greatly injured and deprived of great profits, which otherwise he might and would have derived and acquired from the said new and useful improvement; and by reason

thereof, the said plaintiff hath sustained actual damage to the amount of twenty thousand dollars, whereby, and by force of the statutes of the United States, action hath accrued to the plaintiff to recover the sum of sixty thousand dollars, being three times the amount of such actual damage.

And also, for that the said plaintiff was the true and original inventor of a certain new and useful improvement in the letters patent hereinafter mentioned [and] described, being an improvement in the mode of turning short curves on railroads, which was not known or used before the time of his first application for a patent, as hereinafter mentioned; and the said plaintiff being a citizen of the United States, and as aforesaid the true and original inventor thereof, on the twenty-third day of August, one thousand eight hundred and thirty-one, made application in due and proper form of law, to the Secretary of State of the United States, for letters patent for the same, and made oath that he verily believed, that he was the true inventor or discoverer of the said improvement, and paid into the Treasury of the United States the sum of thirty dollars, and delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent might be granted for that purpose. And the Secretary of State of the United States, thereupon caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the day and year aforesaid, under the seal of the United States, and duly tested by the President of the United States, according to the form of the statute in such case made and provided. Wherein and whereby was granted according to law, to the said plaintiff, his heirs, administrators or assigns, for the term of fourteen years, from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, and using, and vending to others to be used, the said improvement, a description whereof was given in the words of the said James Stimpson himself, in a schedule thereto annexed, and was made a part of the said letters patent; and afterwards, to wit, the twenty-sixth day of September, one thousand eight hundred and thirty-five, the said letters patent were cancelled in due form of law, on account of a defective specification, and the Secretary of State of the United States caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the said twenty-sixth day of September, one thousand eight hundred and thirty-five, under the seal of the United States, and duly tested by the President of the United States according to the form of the statute in such case made and provided; whereby and wherein was granted to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years, from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and ex-

clusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement; a description whereof was then given in the words of the said plaintiff himself, in the schedule annexed to the said letters patent, and was made a part thereof, as by the said last mentioned letters patent in court to be here produced, reference being thereunto had, will fully appear; and the said plaintiff says, that he the said plaintiff did always, from the time of making and granting the said last mentioned letters patent as aforesaid, exercise, use and enjoy the said right and liberty, to the day of the commencement of this suit, to his great profit and advantage, to wit, at the district aforesaid; and in that respect, has made, constructed, and used, and vended to others to be used, the said improvement to his great profit and advantage, to wit, at the district aforesaid.

Yet the said defendants, well knowing the premises, but contriving and wrongfully, and injuriously intending to injure the plaintiff, and to deprive him of the profits and advantages, which he might and otherwise would have derived and acquired from the exclusive making, constructing, using, and vending to others to be used, the said new and useful improvement, after the making of the said last mentioned letters patent, to wit, the first day of April, one thousand eight hundred and thirty-nine, at the district aforesaid, and at divers other days and times between that day and the commencement of this suit, did make the new and useful improvement aforesaid, unlawfully and unjustly, without the consent and against the will of the said plaintiff, in breach of the letters patent aforesaid, and in violation and infringement of the right, privilege and liberty, so as aforesaid granted to the plaintiff, and contrary to the form and effect of the statute in such case made and provided. Whereby the said plaintiff hath been, and is, greatly injured and deprived of great profits, which otherwise he might and would have derived and acquired from the said new and useful improvement; and by reason thereof, the said plaintiff hath sustained actual damage to the amount of twenty thousand dollars, whereby and by force of the statutes of the United States action hath accrued to the plaintiff to recover the sum of sixty thousand dollars, being three times the amount of such actual damage.

And also, for that the said plaintiff was the true and original inventor of a certain new and useful improvement in the letters patent hereinafter mentioned [and] described, being an improvement in the mode of turning short curves on railroads, which was not known or used before the time of his first application for a patent, as hereinafter mentioned; and the said plaintiff, being a citizen of the United States, and, as aforesaid, the true and original inventor thereof, on the twenty-third day of August, one thousand eight hundred and thirty-one, made application, in due and proper form of law, to the Secretary of State of the United States, for letters patent for the same, and made oath that he verily believed that he

was the true inventor or discoverer of the said improvement, and paid into the Treasury of the United States the sum of thirty dollars, and delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent might be granted for that purpose; and the Secretary of State of the United States thereupon caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the day and year aforesaid, under the seal of the United States, and duly tested by the President of the United States according to the form of the statute in such case made and provided, wherein and whereby was granted, according to law, to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof was given in the words of the said James Stimpson himself in a schedule thereto annexed, and was made a part of the said letters patent; and afterwards, to wit, the twenty-sixth day of September, one thousand eight hundred and thirty-five, the said letters patent were cancelled, in due form of law, on account of a defective specification; and the Secretary of State of the United States caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the said twenty-sixth day of September, one thousand eight hundred and thirty-five, under the seal of the United States, and duly tested by the President of the United States, according to the form of the statute in such case made and provided, whereby and wherein was granted to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof was then given in the words of the said plaintiff himself in the schedule annexed to the said letters patent, and was made a part thereof, as by the said last mentioned letters patent in court to be here produced, reference being thereunto had, will fully appear; and the said plaintiff says that he, the said plaintiff, did always, from the time of the making and granting the said last mentioned letters patent as aforesaid, exercise, use, and enjoy the said right and liberty to the day of the commencement of this suit, to his great profit and advantage, to wit, at the district aforesaid; and in that respect has made, constructed, and used, and vended to others to be used, the said improvement, to his great profit and advantage, to wit, at the district aforesaid.

Yet the said defendants, well knowing the premises, but contriving and wrongfully and injuriously intending to injure the plain-

tiff, and to deprive him of the profits and advantages which he might and otherwise would have derived and acquired from the exclusive making, constructing, using, and vending to others to be used, the said new and useful improvement after the making of the said last mentioned letters patent, to wit, the first day of April, one thousand eight hundred and thirty-nine, at the district aforesaid, and at divers other days and times between that day and the commencement of this suit, did use the new and useful improvement aforesaid, unlawfully and unjustly, without the consent and against the will of the said plaintiff, in breach of the letters patent aforesaid, and in violation and infringement of the right, privilege, and liberty so as aforesaid granted to the plaintiff, and contrary to the form and effect of the statute in such case made and provided, whereby the said plaintiff hath been, and is, greatly injured and deprived of great profits, which otherwise he might and would have derived and acquired from the said new and useful improvement; and by reason thereof, the said plaintiff hath sustained actual damage to the amount of twenty thousand dollars, whereby and by force of the statutes of the United States, action hath accrued to the plaintiff to recover the sum of sixty thousand dollars, being three times the amount of such actual damage.

And also, for that the said plaintiff was the true and original inventor of a certain new and useful improvement, in the letters patent hereinafter mentioned [and] described, being an improvement in the mode of turning short curves on railroads, which was not known or used before the time of his first application for a patent as hereinafter mentioned; and the said plaintiff, being a citizen of the United States, and, as aforesaid, the true and original inventor thereof, on the twenty-third day of August, one thousand eight hundred and thirty-one, made application, in due and proper form of law, to the Secretary of State of the United States for letters patent for the same, and made oath that he verily believed that he was the true inventor or discoverer of the said improvement, and paid into the Treasury of the United States the sum of thirty dollars, and delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent might be granted for that purpose; and the Secretary of State of the United States thereupon caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the day and year aforesaid, under the seal of the United States, and duly tested by the President of the United States according to the form of the statute in such case made and provided, wherein and whereby was granted, according to law, to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and *and* exclusive right and liberty of making, constructing, using, and vending to others

to be used, the said improvement, a description whereof was given in the words of the said James Stimpson himself in a schedule thereto annexed, and was made a part of the said letters patent; and afterwards, to wit, the twenty-sixth day of September, one thousand eight hundred and thirty-five, the said letters patent were cancelled in due form of law on account of a defective specification; and the Secretary of State of the United States caused letters patent to be issued in the name of the United States of America, bearing date at Washington, the said twenty-sixth day of September, one thousand eight hundred and thirty-five, under the seal of the United States, and duly tested by the President of the United States, according to the form of the statute in such case made and provided, whereby and wherein was granted to the said plaintiff, his heirs, administrators, or assigns, for the term of fourteen years from the said twenty-third day of August, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description thereof was there given in the words of the said plaintiff himself in the schedule annexed to the said letters patent, and was made a part thereof, as by the said last mentioned letters patent in court to be here produced, reference being thereunto had, will fully appear; and the said plaintiff says that he, the said plaintiff, did always, from the time of making and granting the said last mentioned letters patent as aforesaid, exercise and enjoy the said right and liberty to the day of the commencement of this suit, to his great profit and advantage, to wit, at the district aforesaid; and in that respect has made, constructed, and used, and vended to others to be used, the said improvement, to his great profit and advantage, to wit, at the district aforesaid.

Yet the said defendants, well knowing the premises, but contriving and wrongfully and injuriously intending to injure the plaintiff, and to deprive him of the profits and advantages which he might, and otherwise would have derived and acquired from the exclusive making, constructing, using, and vending to others to be used, the said new and useful improvement, after the making of the said last mentioned letters patent, to wit, the first day of April, one thousand eight hundred and thirty-nine, at the district aforesaid, and at divers other days and times, between that day and the commencement of this suit, did sell the new and useful improvement aforesaid, unlawfully and unjustly, without the consent and against the will of the said plaintiff, in breach of the letters patent aforesaid, and in violation and infringement of the right, privilege, and liberty so as aforesaid granted to the plaintiff, and contrary to the form and effect of the statute in such case made and provided, whereby the said plaintiff hath been and is greatly injured, and deprived of great profits, which otherwise he might, and would have derived and acquired from the said new and useful improvement. And by reason there-

of, the said plaintiff hath sustained actual damage to the amount of twenty thousand dollars, whereby and by force of the statutes of the United States action hath accrued to the plaintiff to recover the sum of sixty thousand dollars, being three times the amount of such actual damage.

By means whereof, and by reason of the premises, the said plaintiff says, that he, the said plaintiff, hath been greatly injured, and hath sustained damage to the value of sixty thousand dollars, action whereof hath accrued to the said plaintiff to demand and recover the same of the said Westchester Railroad Company, and therefor he brings suit, and brings here into court the letters patent aforesaid, and that the same may be seen by the court.

JOHN DOE and RICHARD ROE. } Pledges to prosecute.

J. R. INGERSOLL, *for plaintiff.*

And thereupon, the said The West Chester Railroad Company, by John Miles, esquire, their attorney, come and defend the force and injury, when, &c., and plead not guilty, and issue. Therefore, let a jury thereupon come before the judges of the said court, at a session of the same court, to be holden at Philadelphia, on the twelfth day of April, A. D. one thousand eight hundred and forty-one, by whom, &c., who neither, &c., to recognize, &c., because as well, &c. The same day is there given to the parties aforesaid, &c. On which said twelfth day of April, 1841, come the parties aforesaid, by their attorneys aforesaid, and further day is given to the parties aforesaid, until the eleventh day of October next, then and there, &c. Therefore, as before, let a jury thereupon come before the judges aforesaid, at a session of the said court, to be holden at Philadelphia aforesaid, on the said eleventh day of October, by whom, &c., who neither, &c., to recognize, &c., because as well, &c. On which said eleventh day of October, A. D. 1841, come the parties aforesaid, by their attorneys aforesaid, and further day is given to the parties aforesaid, until the eleventh day of April next, then and there *and there*, &c. Therefore, as before, let a jury thereupon come before the judges aforesaid, at Philadelphia aforesaid, on the eleventh day of April next, by whom, &c., and who neither, &c., to recognize, &c., because as well, &c. On which said eleventh day of April, come the parties aforesaid, by their attorneys aforesaid.

Afterwards, to wit, at a session of the same court, holden at Philadelphia aforesaid, before the judges aforesaid, on the twenty-seventh day of April, A. D. one thousand eight hundred and forty-two, (1842) come the parties aforesaid, by their attorneys aforesaid, and the jurors of the jury aforesaid being called likewise, come, to wit: Emerson McIlvaine, George W. Jones, Thomas Cock, James Crissy, Peter Binder, Charles Lukens, Jacob Murray, James Hutchin-

son, John Warder, John Wyeth, Thomas J. Lloyd, and Christian Weyman, who, being duly empannelled, returned chosen, tried, and sworn or affirmed, to speak the truth of the matter within contained. And upon the trial of the issue aforesaid, the counsel of the said plaintiff, to support and maintain the same, gave in evidence certain letters patent as follows, namely:

"The United States of America, to all to whom these letters patent shall come:

"Whereas James Stimpson, a citizen of the United States, hath alleged that he has invented a new and useful improvement in the mode of turning short curves on railroads, for which letters patent were granted the twenty-third day of August, 1831; which letters being hereby cancelled on account of a defective specification; which improvement he states has not been known or used before his application, hath made oath that he does verily believe that he is the true inventor or discoverer of the said improvement, hath paid into the Treasury of the United States the sum of thirty dollars, delivered a receipt for the same, and presented a petition to the Secretary of State, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose. These are, therefore, to grant according to law to the said James Stimpson, his heirs, administrators, or assigns, for the term of fourteen years, from the twenty-third day of August, 1831, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said James Stimpson himself in the schedule hereto annexed."

Tested at Washington under the seal of the United States, on the 26th September, 1835, by the President, and certified in the usual form by the Attorney General.

Schedule referred to in these letters patent, and making a part of the same.

Short curves.

23*d August*, 1831.—*Renewed 26th September*, 1835.

To all whom these presents shall come: Be it known, that I, James Stimpson, of the city and county of Baltimore, and State of Maryland, have invented a new and useful improvement in the mode of turning short curves upon railroads with railroad carriages, particularly those round the corners of streets, wharves, &c., and that the following is a full and exact description of said invention or improvement, as invented or improved by me, viz: I use or apply the common peripheries of the flanches of the wheels for the aforesaid purpose, in the following manner: I lay a flat rail, which however may be grooved, if preferred, at the commencement of the curvation, and in a position to be centrally under the flanches of the wheels upon the outer track of the circle, so that no other part of

the wheels which run upon the outer circle of the track rails shall touch or bear upon the rails, but the peripheries of the flanches they bearing the whole weight of the load and carriage, while the opposite wheels which run upon the inner track of the circle are to be run and bear upon their treads in the usual way, and their flanches run freely in a groove or channel; which treads are ordinarily about three inches in diameter less than the peripheries of the flanches.

Were the bearing surfaces of the wheels which are in contact with the rails while thus turning the curve to be connected by straight lines from every point, there would thus be formed the frustrums of two cones, (if there be four wheels and two axles to the carriage,) or if but one axle and two wheels then but one cone; which frustrums, or the wheels representing their extremities, will, if the wheels are thirty inches in diameter, and are coupled about three feet six inches apart, turn a curve of about sixty feet radius of the inner track rail. The difference in diameter between the flanches and treads before stated, the tracks of the usual width, and the wheels coupled as stated, would turn a curve of a somewhat smaller radius, if the axles were not confined to the carriage in a paralell position with each other; but this being generally deemed necessary, the wheels run upon lines of tangents, and these upon the inner track being as wide apart in the coupling as the outer ones, keep constantly inclining the carriage outwards, and thus cause the carriage to tend to run upon a larger circle than the difference in diameter of the treads and flanches would otherwise give; but the depth of the flanches and the couplings may be so varied as to turn any other radius of a circle desired.

What I claim as my invention or improvement is the application of the flanches on the wheels on one side of railroad carriages, and of the treads of the wheels on the other side to turn curves upon rail ways, particularly such as turning the corners of streets, wharves, &c., in cities and elsewhere, operating upon the principle herein set forth.

JAMES STIMPSON.

Witnesses—James H. Stimpson,
George C. Penniman.

And then called as a witness, Thomas Temple, who being duly sworn, deposed as follows:

Thomas Temple—know pl'tffs invention; travelled the W. Ch. R. R. about 8 years ago, and frequently since last winter and summer, and at frequent intervals during the 8 years; the West Chester railroad company have in use 5 or 6 curves of this character; 3 in Philadelphia, 2 of them in the depot, and 1 in the street; 1 three miles this side of West Chester, and in town 2 or 3, or at depot, &c.; saw them 8 years ago, and within 2 or 3 years have seen them all.

Cross examined.

Did not examine these curves particularly; there has been an alteration in them within 3 or 4 years; I keep horses and carts, am not a machinist; all I know is, there were turn outs to go in; don't know their construction; alterations after dispute; dont know what they were; Malcomb made them; the turn out three miles from West Chester is where track goes to the lime quarries. Plaintiff's close.

Defendants' evidence.

4. Journal Franklin Institute, N. S. p. 270; obj. page not specified in notice; obj. overruled; an index shews the thing described; see paper V.

April and June, 1829, two patents for turnouts on R. R., to J. Wright of Columbia, Pa.; see paper marked V.

Sept. 1829, do.; a third to do., on same subject; see paper V.

John Elgar, V. D. in chief.—In 1826, saw a model in York town, Pa., of R. R. cars; square flanges; on extreme edge of flang square, not round; by rolling on the flange to turn on the outer rail flanges all of one height forming a cone so as to conform to the radii of the curvatures, making them all alike; one wheel to run on the flang, the other on the tread; no groove, but a guard rail for the outside flange to rest against; guard rail on exterior of curve and exterior side of the rail; made by one Davis, who was a steam engineer; is now dead; when O. R. R. first opened to Ellicott Mills, in the latter end of May, 1830, the double switch did not answer well for a turn out; I suggested dispensing with one switch (I was an assistant engineer) on the exterior side of the track, and to open the inner switch on interior track against a which would form a groove to guide the flange of the interior wheel, to provide for carrying the wheel over a fixed point on the other side; Mr. Winans was superintendant; suggested to roll on the flange, the whole of the cast part which was opposite the switch, which was about 5 feet long; it worked well practically; the friction on the switch being on that side of the car which ought to be retarded in making the turn; first alteration constructed; made about middle of July, 1830, and put to work on the R. R., and that summer and fall about 12 altered improvements were made; purpose was to run from one track to another, both wheels on one side worked on their flanges; on the other side both wheels ran on the tread, with flanges rolling in a groove made by the switch, which was on the short or inside, towards the track to which car was impelled; wheels would force switch to spring to its bed, so as to suit the curvature; intention was to make the conical effect, and turn with more facility; this is a drawing of what I have described; it is an accurate representation; saw pl'tff in Baltimore, during season of 1830, constructing a horse car, which I saw running on a R. R.; these alte-

rations were public, on the main track, all the way along the line to Ellicott's Mills.

After 2 turn outs had been altered, the idea occurred to me, to cross the track entirely in that way, and continue the groove and plate for the flange to roll on, (in August, 1830;) did not carry it into effect, on account of the expense. At E. Mills there was a bridge 60 feet endways from R. R.; my plan was adopted by the chief engineer, J. Knight, in fall of 1830; Winans made a model of a railway on that place soon after it occurred to me; Knight had the castings made that winter of full size, and in April, 1831, tried it at the outer depot; and directed one to be put down at this bridge in September, but somewhat modified; the wheels which rolled on their flanches, also rolled in a groove; in the one in April at the outer depot the wheel ran on the flange on the outer wheels of the curvature, and the other in their A on inner sides; on half of the ept. were grooved on outside, and other half on inside.

A groove may answer on either side, to answer the purpose of a guard.

4 and 5 annual reports of the B. and O. R. R. Co. were published in Balt. in 1830–31; think I saw pl'tff in April, 1831, at the outer depot; derived no idea on the alterations from pl'tff or any other person; I took out no patent.

X examined.—Pl'tff sued me in Baltimore; first employed by Co. in 1829 or '30, left them in 1830; directed building of cars and planning of turn outs; never took a patent for a turn out, but did for R. R. wheels and a revolving platform, and a particular kind of box for the outside of the R. R. cars; not for a particular kind of rail; did for fixtures for a turn out; put some rails on the P't D't R. R.; put some down between outer depot at Balt. and woods, in spring 1835; did not claim them; got them at a forge at the Point. This is a copy of a letter addressed by me to Mr. McCullock, pl'tff's counsel.

Qu. Did the B. and O. Co. purchase the patent right from pl'tff?

Obj. That growing out of ex'n in chief. *Qu. overruled.*

Cannot say that this is a true copy; it may be so; can't say any part is not accurate.

Letter offered; objected. 1. Not relevant; 2. The original not accounted for.

Think I did not see a model of pl'tff's curve in 1830; saw a board in spring of 1831, with some lines on it, &c.; saw a board in and there examined it; had seen it before, but took no notice of it.

2nd. vol. Repertory of Pat. inventions p. 59, James' patent 1825.

4. Report of B. and O. R. R. Co. p. 68, 69; 5 report of do. p. 100, 101.

Gray on R. Roads, p. 169, 70, 82, 71, and plates fronting page 24 of preface.

28 April—William Williamson.—Am Secy. and Tr. of W. C. R. R. Co.; not a stockholder; have been connected with Co. since

1831; there were 2 of the turn-outs or curves on the road which were used; one in W. C. abandoned; the others likewise, and taken up in May or June, 1839; one in the branch road laid down in 1834, and taken up in 1841; single switch is now used; same as described in drawing attached to 5 rep. of the B. and O. R. R. Co.; am a mechanic; so far as I can judge, the principle and application are the same; the curve is only an extension for the old curve, they have substituted the rail with an edge coming to a point, and the wheel turns round on the outer rail; the diameter of the outer rail is not increased, the inner runs on the bearing in the usual way; friction is in a great measure destroyed by running on the point of the outer rail; this answers full as well, and there are fewer accidents than in the old way.

X examined.—One curve on pl'tff's plan was on Broad street in Philadelphia; the present turn-out is like all others; there was one on road 4 miles from Chester.

Josiah White.—Am familiar with R. R. since 1829; made switches for turn-outs from one track to another, in 27, 8, or 9; the wheels rolled on the tread and crossed on the flange; the guard to keep the wheel in position was by a deep groove; in comparing this drawing in 5 report, with the curve of 6 feet radius, there is no difference or application; so far as this drawing goes same principle operates both way; they enlarge the diameter by the enlarged diameter of the flange over the tread; as in the revolutions of a tumbler; used an instrument called a dinometer, to ascertain what power was necessary to move a boat or car; applied it to turnouts and curves, and found there was more power in this mode than by the curves.

Matthias W. Baldwin.—Have seen the curved ways of pl'tff; this drawing in 5 rep. as far as it goes, is similar in principle, mode of operation and effect, as the curves; the principle in is to make the periphery of the flange operate on a larger curve, to get the advantage of a cone; one wheel operating on the flange, the other on the tread; the diameter of outer wheel being 2½ to 3 inches larger by the increase of size of the flange over the tread, which is about 1½ inches; in my opinion, the principle of the cone operate axles are . It depends on the comparative friction on the flange and the tread; so far as the boxes permit a radius the conical principle operates, but whatever the principle may be, it is the same in curves and switches; think switches were made when the first roads were laid down; there are several turn-outs in Broad street, where the rail is at a point, and the tread runs on it; it operates as well as the curve, and I think better; these must be slippery, unless the curves are of same diameter.

X-examined—Am a director of Eliz. and R. R. in N. J. and I presume they use plaintiff's curves.

Solomon W. Roberts—Have been an engineer 14 years; know the turn-outs in the drawing E. R. and curves; the principles are identical so far as switch extends 4 or 5 feet in its application and

effect; a single axle with one pair of wheels would roll round in a curve on principle of a cone; with 2 axles parallel and fixed, the wheels are one side on the flange, and the other on the tread.

Qu. It can only be ascertained by experiment.

X—Am officer in Norristown R. R.; they use a curve on plaintiff's plan, to connect it with the Willow st. R. R.

James M. Bolton—Have been connected with R. R. cars since 1828; extensively in transportation; first used the R. R. car in Schuylkill Co.; the plan of this drawing and curves have both been used by me; principle and mode of operation are the same; out wheel runs on the flange and surface of the rail, the inner runs in a groove on the tread of the wheel; is kept in its position by the tongue; no engineer; my business is to be on R. R.

X—There is a difference of $\frac{3}{4}$ of an inch between tread and edge of flange; I have never used any but plaintiff's plan; think friction in Broad st. turn outs is more than in his; on this account I prefer his.

John C. Cresson—Am mechanic; this drawing and curve of plaintiff are identical; principle theory is having wheels on opposite ends of the axle of different diameters, by using periphery of flange for outer, and the tread for the inner.

William Strickland—In 1824–'5, saw grooved rails made of iron in England, laid down on a R. R.; this turn-out, and plaintiff's curved ways, are on same principle; inner wheels must be guided by a groove as a guide—this is plaintiff's plan; and switch has same effect.

X—Stimpson has a substitute for the pivot; merit of his plan is to keep car in its place, it must be a conical principle.

‖ axles, when parallel, don't operate on conical principle, but on a number of small chords; with one axle, the conical principle operates.

Coffin Colhitt—Was in Baltimore in 1829–'30; engaged in Balt. and O. R. R.; helped to lay down some turn-outs or crossings on Mr. Elger's plan, as in this drawing; the plan was altered in 1830 or 1831; went there in October, 1829; left there in 1831; switches put in in spring or summer; out wheels run on flange; inside run on the tread of the wheels; inside flange ran between rail and tongue, and turned on from a straight line; tongue directed car, and where open form the groove; first curve I ever saw was in 1831, at Ellicott's Mills; not by have ever since been a railroad constructor; so far as the wheel rolls on flange, the turn-outs and curved ways are the same in principle, operation, and effect; Elger had charge of alteration; think employed me.

X—Out flange directs car from one direction to another and increases diameter; switches are put in on a straight line; may be put in on curves.

‖ must be a tongue or two switches.

Elwood Morris—Civil engineer 13 years; principle, mode of ope-

ration, and effect of turn-out, as far as it goes, is same as plaintiff's; principle in both attempted, is to bring into action a cone, by causing outer wheel to run on flange; but does not operate on the cone; car is driven into the direction of a curve by operation of the flange, acting in the groove in the curve, on interior side, and groove being a guide, produces the effect entirely by the operation of the guide; have seen many curves; think no utility in rolling on curves like Stimpson's; have see one or two running on the edge rail; no economical advantage in his over the ordinary curve; effect of experiments is, that resistance is inverse to of curve, and 1 pound to the ton was against plaintiff's patent; direction of car to a curved line is altogether produced by flange; there must be some barrier to produce resistance to outside of flange, and excepting groove, no advantage results from plaintiff's mode; to extent of play of axle in boxes, a conical effect is produced.

X—Increase of diameter of out wheel don't make car move in a curve with 2 parallel axles; carriage could be made with wheels of different diameters, so as to run in a direct line; no doubt same number of cars would move round the ordinary curve as on plaintiff's, *in* a radius of 60 feet, without moving off.

Dr. Robert Patterson—Result of my examination of the motion of cars in a curve is, that a curve would be described with 2 wheels, only one axle, one wheel on flange, and one on tread; make a different diameter, with 2 pair of wheels with parallel axles; their tendency, separately, is to a curve, but with different centres; both cannot describe the proper circle, (all R. R. cars are with 2 parallel axles,) there must be slipping; when weight is equal on both sets of wheels, a circle of larger and uncertain radius is formed, when no guide, and they move freely on their surface; with a guide, they operate differently; if weight is principal weight, on either the out or in wheels, the movement would become straight line, it depends on the greater or less adhesion; if wheels are on same , and both on a tread, there would be no conical motion; passing from one track to another, as in this drawing, there is no difference of principle, mode of operation, or effect, from plaintiff's.

X—With end of the groove, the curve is obtained, and grooves are necessary to keep the cars on the road; when one wheel runs on a flange, the other must run in a groove.

‖ Load is mostly on one axle, so as to give adhesion on one pair of wheels, then the action will describe a circle on the conical principle, and drag the other wheel along.

Deposition of Dr. Thomas P. Jones, taken on interrogatories, taken 4 May, 1841. See paper A, 9 vol. Fra. Journal, pp. 124–'5, description of patent, of Aug. 23, 1831. See paper B.

Mr. Elgor—Flat edge flange would be dangerous, running on a common tract, by reason of inequalities in the rails; round edged flange is best; I used them in turnouts in a to them.

29 April—Running wheels with flat flanges not so safe as edged

ones; have laid and repaired R. R. tracks; expansion less in flat bar. At the junction of the bars, the flat ones are more liable to throw car off the track; the sharp flange is now in general use. There are other curved R. ways besides plffs., and applied to answer as well; know of 2 kinds, one called Nagle's, the other Malcolm's; his had a sharp outer rail.

X—There are a number of Malcolm's at Broad st.; Nagle's is on the Trenton R. R.; they were laid in place of plff's; know no other place where they are to be seen; Naglee's has no groove, but a guard rail on outside, inclined inwards; in Malcolm's runs on the tread; Naglee's on the flange. I have an interest in the Eliz. & Som'e R. R. in N. J., where they use a curve on plff's plan. Def'ts close.

Rebutting.

James H. Stimpson, son of plff., was on B. & O. R. R. 9 or 10 of Dec'r, 1829. Pl'ff and I had ex'd the R. coming in; there was an elevation of ground 100 yards from depot; had a full view of R. R.; he said in a few years R. R. must come into city, and must turn into stores by short turns; he had a way of enabling cars to turn corners, simple and effective; that caused too much obstruction; asked him mode; he asked me if I understood the principle of the cone; I said I did; he said to get round the streets he would so place the rail on the outer track of the circle that the weight of the bar would be taken entirely on the flange; would have 2 grooves—one on each track as a guide to prevent obstruction, which would throw the box from the track. Next day he made a drawing of the plan, and got me to assist him in measuring the streets of the city, to see whether the size in the flanges would enable a car to turn a curve in the ordinary width of the streets. This is the drawing made at the time. Shortly after he went down to Merritt & Hortman's cabinet house, and ordered a model, which I afterwards saw them working at (within 6 or 8 weeks;) saw model completed; it was taken to office of the B. & O. R. R. Co. This is a representation of model; the other was 2 or 3 times as large; it remained there 10 or 12 mos.; in bringing it home a black man let it fall; it was broken; taken to office about 13 Oct., 1830; saw it there several times: office at corner of Fayette and Calvert sts.; engineers were in the habit of being about there; their office was there; saw model lying on table of pr'd't and directors; never saw this paper out of plff's possession, or in hands of any other person; heard plff. explain plan to Mr. Merritt; have studied mechanics; engineering my business; have measured Elgor's first switches, 4 feet long; lengthened after so as not to make so abrupt an angle; about a year after first made of the car axles were about 4 feet—some 5 feet; saw an exp't of plff's imp't on a large car; wheels 30 in. diameter in spring of 1831; wheel on one side turned so as to be equal to the diameter of the flanges on other side equal to diameter of tread; made a drawing of plan; tried to see if car

would turn round without a groove to assist in guiding; finding the boards of the floor sprung, took it down to a sail ; found that pushing the bar along the floor it formed a circle of 60 feet radius, axles parallel; no flanges or grooves; 1½ inches difference in radius, and 3 in diameter of the outer and inner wheels; no other results.

In 1825 plff. made power looms for broadcloths—made first in country: have seen switches used at Mauch Chunk; have drawings of them; made this there last fall; flange 1½ in. rail, 1¼ in. inside, 1½ outside; plate 4 feet long; tongue 3 feet 3 in., flanges flatted on edge; run on tread on outside; depth of flange and groove about the same when they crossed track; weight of car roll on flange.

This is a rep'n of James & Wright's patents.

X—Am in my 25th year; born in August; lived with my father in '29, (in N. York,) and ever since, unless absent on business for him; saw this drawing in 1830 and '31, and when going to trunk to look for other papers I put no mark on it; know it from appearance of drawing. This board was made during the last trial, (1838,) 6 years after the old was broken, 7 or 8 years; don't know who made this; made under plff's direction; no means of knowing it the same but from recollection; think it a fac simile; 2 grooves on the old one; one deeper than the other; flange ran on bottom of groove on outside, and on the inner on the rail; I am connected with plff's business; not selling patent rights; think I saw plff. specification of patent of 1831; he took out 6 patents; I copied some; not all; don't know what became of copies; think there none in existence; saw Nelson copy this sent to patent office; found no copies after searching for them; model was sent to office in 1831; different imp'ts on same model; plff. made it; now think plff. made this (board) model; frequent conversations on this subject—first in 1832 or '33; in fall of 1830 plff. went to Balt. to try a horse car; we got there in Nov. 1829; plff. was engaged, in '30 & '31, in construction of turn abouts in Balt. for the Co., and other revolving platforms, which, he said, would not answer; 8 were laid down in Pratt st., & were afterwards taken up; saw plff. drawing this drawing—his handwriting.

Henry R. Campbell—Am an engineer 14 years; have been familiar with plff's patent some years, and in reference to other modes of short curves; his decided advantage by the conic principle; this is general impression from its almost universal adoption, and supersedes all other modes, so far as I know, where individuals run cars to their own stores; agree with Patterson. All wheels are a little conical—larger near the flange $\frac{1}{8}$ of an *in.*, which causes the cars to vibrate from side to side by conical action.

X—This is plan of Mr. Nagley; this is Wright's first plan (he had two) with more than one periphery similar to James' patent.

Since plff's plan other plans have been introduced; in Malcom's plan, the rails and flange are like a Gothic arch Λ.

The mechanical principle of all is to act on conical principle; there must be a guide or groove for a curve; flange guides on the common straight road.

‖.—Morber's plan is only 2 years ago—Malcolm's 6 years, sent down as a substitute for plff's after suits by him—rolls by the flange.

Read the drawing of 1829.

William Norris—Have seen plff's curve; it is unequalled; others don't compare with it; remarkable for its simplicity; practically superseding others; nothing but a pivot will turn so short a curve; have seen trains of 4 double cars pass curves on his plan; none other used in Balt. and on Ph. Wil. & B. R. R.; the advantage is immense—equal to the advantage of a R. R., wherever there is a necessity for curves or pivots.

X—Have never ex'd Malcolm or Naglee's; have ex'd Malcom's; the cars went round pulled by horses; groove indispensable.

Caleb Merritt—Lived in Baltimore in 1829; pattern-maker; made a model for plff. late in fall; finished in spring of 1830; model of curved way in streets similar to this in every respect; there was an inside groove of sufficient depth to hold the flange of the wheel to run on tread; a groove on outside to run on flange. The out groove was a safe guard against accidents; model went to R. R. office.

George Nelson—Live in Baltimore; knew plff. in 1827 –'8; he explained his plan in 1830, in spring; copied all his manuscripts for his patents; believe this is same plan; saw his large model at his house & R. R. office.

13 Oct., 1830—This is my handwriting copied from original in plff's handwriting; offered evidence of notice to Woodville of plff's invention—*obj*—obj. overruled. About time of this letter, explained plff's plan to Woodville, who was in employ of Co.; he said that will do.

Qu.—What did plff. say about Elger making the switches—*obj.*—obj. sustained.

This is a sketch of plff's plan made by Woodville, and his notes on it.

X—Groove to be on other side.

30 Oct., 1830—Paper X, affidavit of Woodville, read. See the same hereto annexed, marked X. Deposition of William A. Stimpson offered—*objected*—*rejected.*

30 April—Richard Caton, esquire—Saw a large model of this, which was in office of B. & O. R. R. Co., for more than 12 mos.; saw it there often, much approved of, as now, by Elger, Wynans, Knight, and all officers of the Co. as new principle, and wondered they had not found it out before; have seen the Woodville paper—the two lines at top my handwriting.

13 Oct., 1830—Know this paper; handwriting of Mr. Nelson; the X was in possession of Co.; endorsement not Nelson's; some

of the clerks in the office. After plff. & I had spoken of utility of invention, I suggested to Mr. Thomas to make the invention known and adopted; he agreed, & I had the model taken to the office; board ex'd by number of Co.; merits ascertained; suggested to carry it into effect; thought left to take it into town.

Letter before the model—There was a groove on inner wheel; the other ran on a plan made with the usual breadth; recollect groove distinctly; on inner circle; outer higher than the other; plff. had told me the mechanical construction; (there was a little model; don't know who sent it;) he explained the groove; many conversations with Wynan & Elger in office about the model; nothing suggested which was about novelty; never saw a curve constructed by plff.; Co. made them by a ; they paid him 5,000 drs.

13 October, 1830—Letter from plff. to President of B. & O. R. R. Co. See paper marked N.

John Passenger—Lived in Mauch Chunk, June, 1822; am iron-founder; made castings for Mauch Chunk R. R.; know plff's curve since I came here; used for first time; nothing like it, as I know of, in that R. R.; is to carry the across the R. R. at M. *Ck.*; flange touches nowhere, except at the crossing those forges; know nothing like this.

X—They use switches like these there; runs on flange on one side, and on the tread on the other.

‖.—On flange opposite the switch.

William Slicer—Brought up a coach maker; familiar with R. R. and their construction; live in Balt.; have seen Naglee's & Malcolm's plan; understand their principles and that of pltff.; Nagle's involves plff's principle at certain times in toto; in best operation much inferior to it; rail on outside of outer circle makes much greater resistance, more friction, & more danger of running off; cone is here; in Malcolm's it slips more than pltff's, and friction is increased.

In Malcolm's all that interferes with plff. is the groove, which is a very essential part of the invention.

X—One of the strong features of plff's patent is the conical principle—more broad in its application before. Wright's is on same principle; know of no experiments on Malcolm's; rather depends on principle than exp'ts on any R. R. I have ever seen.

Mr. Passenger—Raising outer rail gives conical action; no drawing to patent.

Read from docket issued 30 Sept., 1840; No. of Nov. term 1832. In circuit court U. S., Stimpson vs. Balt. & O. R. R. Co.; read record 11 Oct. 1834; case agreed; deft. to pay costs.

Offer record of suit, Stimpson vs. Trenton R. R. Co. in regard to the question of damages, *objected.* Res. inter alias certa, *rejected.*

James H. Stimpson—Don't know if I copied old patent; the plate patent said that a flange with a flattened edge might be used; but no claim was made to the flat edge. Pl'ff closes.

Deft. read deposition of Richard Caton, as follows:

I am acquainted with the plff. and have known him ever since he first came to reside in Baltimore in the year 1828 and 1829. From the year 1828 to the year 1833 I was not a director of the Baltimore and Ohio Rail Road Company; but I was, in some degree, more than a director. During that time I had frequent intercourse with the President of said company, Mr. Philip E. Thomas, on the subject of the construction of the road, the difficulties to be obviated in making it, and the affairs of the company generally. When I say that I was more in the concerns of the company than a director, I mean that my family had more than one hundred and twenty thousand dollars in the stock of said company; and I felt much interest in its process, and mingled in the concerns of the company with zeal and usefulness. I held a large body of lands lying westward of Baltimore, beginning at the city line, and extending ten miles contiguous to the Baltimore and Ohio Rail Road, through which land said railroad passes two miles and upwards in interrupted places. I gave the company the use of a granite quarry on my land. I gave them also the right of laying the railroad on my land for the above mentioned two miles. I gave them also the timber for supporting arches in construction on the water, and many other conveniences. Added to this I have a large interest in a branch railroad diverging from the Baltimore and Ohio Railroad at the 3rd mile from Baltimore, and terminating at tide water opposite to Eutaw street, called south Baltimore. These circumstances made a community of interest between the company and myself, and often brought me in contact and intercommunication with them and their officers. This is the position to which I allude in calling myself more than a director. Some time in the year 1829 it was contemplated to bring the railroad into the city of Baltimore. I had frequent conversations with the plff. on other improvements which he had made. Among the rest was a wagon propelled by horses inside of the wagon. Plff. was desirous of trying this carriage on the railroad; he applied to me to ask permission for that purpose from the president of the Baltimore & Ohio Railroad Company, Mr. Thomas, which I did, and obtained the permission; 'twas used in 1829 and 1830 whilst the experiment with the horse car aforesaid was making—the period arrived when it became necessary for the company to bring their carriages into town to their depot. During these experiments I had frequent conversations with plff., and with Mr. Thomas on the subject of turning the angles at the corners of the streets. In 1830 the subject of turning these angles was frequently conversed about between plff. and myself, and between Mr. Thomas and myself. Mr. Stimpson, the plff, communicated to me that he had made a discovery which would be very useful to the said company; and he should like to have an opportunity to lay it before the board of directors through my instrumentality and my application. On or about the 13th of

October, 1830, a letter was addressed by plff. to Mr. Thomas, pursuant to an arrangement made between Mr. Thomas and myself, that a model of plff's invention should be laid before the board of directors. This is the letter (marked A.) I can identify it by writing of mine upon the paper. This letter, and a model of plff's invention for turning a corner, (by means of the outer wheels running on their flanges on a flat rail; the inner wheels running on their treads, and with a groove for the flanges,) I delivered to Mr. Thomas. The model was delivered at the office of the Balt. & Ohio Railroad Company. The model was exhibited to the members of the board of directors, and to the persons connected with the construction of the road, and was very much admired by them. The letter and model were delivered as aforesaid, on or about the 13th October, 1830. Those who examined it, as above stated, generally expressed their astonishment at its simplicity, and that it should never have been known before. The model remained in the office of the said company for many months; at length it was removed out of the office. I put [it] in the common passage where every body must have seen it who came in. While in the office, it was openly exposed on a table; and being an entire novelty attracted a great deal of attention and admiration. It remained there many months—perhaps a year. I afterwards applied to have it returned to Mr. Stimpson. Plff. had spoken to me and described his invention as aforesaid, (the model of which I have also spoken of,) a long time before the 13th October, 1830, to the best of my recollection, twelve months before that time. When it was first communicated to me by plff., I regarded it as an entirely new thing, and was much struck by its simplicity and beauty. My nephew, William Woodville, was at that time an officer of the said company, and expressed his astonishment at it, and at the stupidity of mankind in not discovering so simple a thing before. He had himself been endeavoring to invent some plan for turning corners on railroads. I myself have paid a great deal of attention to mechanical principles. While the model lay in the office as aforesaid, I was in the habit of seeing the different officers of the company about the office. I often saw Mr. Jonathan Knight, and sometimes Mr. Ross Winans, at the office while said model was there. I did not see Mr. Elgar so often, as he was then in a subordinate situation. I examined that model particularly in company with said Knight. I recollect that he saw it, and expressed his admiration of it to me; he said it was a beautiful idea, or something of that kind. Mr. Thomas frequently expressed his admiration of it. I never heard it suggested by any body that the invention was not the plff's, until after the publication of the 5th report of the Balt. & Ohio Railroad Company in October, 1831. That report stated that one had been actually put in operation at Ellicotts' Mills. I saw the one at Ellicotts' Mills, day by day, as it was in the course of construction. I supposed it was being made

under plff's direction. I never, for a moment, suspected that it was not, or that his claim to the invention was denied or questioned; my frequent intercourse with the officers of the company continued at that time, and until 1835, at least.

The parts of the letter of 13th October, 1830, (marked A,) which are cancelled, were not printed or published. The newspaper now produced, (marked B,) is the publication to which I referred, dated Feb'y 9, 1831. The reason the letter was shortened was to get it easier into the paper. This letter was in the possession of the board from about the date of the letter till near the date of the newspaper. I often told plaintiff he ought to secure his invention by patent. I do not remember the time at which the railroad was brought into the depot in the city. I think it was not before 1833. This diagram (marked C) was made in my office by Mr. Woodville, before the letter to Mr. Thomas, above spoken of. It was done at my desk. It is a drawing of plaintiff's invention.

The defendants reserving the right to except to all and any part of the foregoing testimony.

Cross examined.

Mr. Thomas, formerly president of the company, is now living in Baltimore. After I got the model on a board back from Mr. Thomas, at the request of Mr. Stimpson, I gave it to the latter. What he has done with it, I don't know. I gave it to Mr. Stimpson from 8 to 12 months after the date of the letter to Mr. Thomas of Oct., 1830. The model was an imitation of what is in reality now in use. I don't recollect that the model was accompanied by a car. I have had no conversation with Mr. Stimpson about the disposition of it since. I never saw but that one model. I saw the model, and saw one in practical use. They appeared to be similar. The first one I saw constructed in practical use was in 1831, at Ellicott's Mills. I never saw it otherwise than the groove upon the inner circle, and the plane upon the outer.

Question. Have you a distinct recollection of the fact as to whether the groove on the model was on the inner and smaller circle?

Answer. I don't know that I could swear to such a fact, but my perfect confidence is that the groove was on the smaller circle, and the same answer applies to the curve at Ellicott's Mills.

Witness looks at page 8 of the letter A, and says, I am not sufficiently acquainted with the application of the sentence thereon, having the words "turned by the flange of the wheel, running upon the bottom of the groove in the outer rail," to explain it. This paper is, with the exception of the alterations, in the handwriting of Mr. George Nelson, copied by him from a rough draft written by Mr. Stimpson. Mr. Nelson was employed in my office at the time. I do not know where the draft written by Mr. Stimpson is—he probably has it. I had no occasion to compare the rough draft prepared

by Mr. Stimpson with the copied paper of Mr. Nelson, marked A. When I say that previous to the 13th of October, 1830, the plaintiff had spoken to me, and described his invention, about 12 months before that time, I speak to the best of my recollection as to the time. I had no motive at that time to fix a date. In regard to my using the words: "Spoken to me and described his invention," I do not mean that Mr. Stimpson spoke of more than a general principle by which he said he could accomplish the object. I do not recollect his entering into details, or particularly describing his invention, or its principle or application. It was a transient conversation. I had confided in Mr. Stimpson's ability so as to believe that he would accomplish the purpose. There was nothing entered into, descriptive as to its mode of operation, but merely a general statement of the end. I cannot particularly specify a date at which Mr. Stimpson first particularly described his invention to me. It was described to me long before it was given to Mr. Thomas. I cannot say how long. I can only speak of his particularly describing the groove upon the smaller circle to me, by my knowledge of the necessity of the existence of such a thing. I only recollect his description as it applies to using the flange, so as to increase the size of the periphery of the wheel on the larger or outer circle to effect the object of going round the curve. When Mr. Knight saw the model in the office, and said it was a pretty idea, or something of that kind, it was shortly after Oct., 1830. I have no recollection of any conversation between Messrs. Winans and Elgar about the model in the office. The experiments of Mr. Stimpson, with his horse car, were to the best of my recollection in 1829 and 1830, on the Baltimore and Ohio Railroad.

Re-examined.—The curved way at Ellicot's Mills is for the use of the mill—it is not part of the B. and O. Railroad—it swerves off from it to the mills. On further recollection, I believe, though I am not positive, that the model above spoken of, deposited in the office of said company, was accompanied by a car.

RICH. CATON.

Sworn and subscribed before me, this second day of November, 1838. JOHN BINNS, *Ald.*

Defendants here closed their case.

2 May.—Mr. Passenger called again, by permission of the court, to correct a mistake in his evidence relative to the switch at Mauch Chunk. He explains that the wheel which is mounted upon the flanche is on the *inner* side, the one towards which the curve is to be made.

After counsel on both sides had addressed the jury, the learned judges delivered their charge to the jury, as the same is set out at length, and appended to the record in this case, and among other matters therein given in charge to the jury, are the following positions:

Having thus presented you with a view of the rules and principles of the common law, applicable to the renewal of patents, as laid down by the Supreme Court, together with the provisions of the different acts of Congress on this subject, we will now state to you what is, in our opinion, their legal result.

To authorize the surrender of an old patent and issue of a new one, consistently with the provisions of the original patent law of 1793, and the decisions of the Supreme Court, independently of any act of Congress conferring such power, there are these requisites indispensable to the power arising. (1.) The original patent must be inoperative or invalid for the causes set forth in the act of 1832—the non-compliance with the 3 section of the act of 1793, for the want of a proper specification of the thing patented, through inadvertence, accident, or mistake, without any fraudu-[lent] or deceptive intention. This being the only case embraced in the law to which the authority conferred applies. (2.) 1, The defect in the specification, which makes it incompetent to secure the rights of the patentee, must have arisen from inadvertence, accident, or mistake, and 2, not from any fraud or misconduct. The re-issue of the patent by the appropriate officer is presumptive evidence that the requisites of the law have been complied with, on the production of such evidence or proof otherwise as justified it; but the question of the validity of the new patent is a judicial one, depending on the fact of inadvertence or fraud, as you shall find it; and the opinion of the court on matters of law involved in the inquiry. 14 Pet., 458; 6 Pet., 243; 7 Pet., 321; act of 1839; 9 laws, 1,021. The reason why there must be an inquiry into both the inadvertence and fraud arises from the settled construction of the act of 1793, that where the defect is not owing to fraud, the defendant is entitled to a verdict and judgment in his favor, but not to a judgment that the patent is void for the defect, unless he shows that the defect was owing to fraud. 1 Bald.; 6 Pet., 246. You must then be satisfied, affirmatively, that the defect of the patent arose from the inadvertence of the patentee, and negatively, that it did not arise from his fraud or misconduct, or, in the words of the acts of 1832 and 1836, "without any fraudulent or deceptive intention." The finding the fact of inadvertence may negative the fact of fraud, but in this, as in other cases, fraud may be inferred from gross inadvertence or negligence, such as may be the indication of a design to deceive the public. The defects in the old patent must be in the specification, when it does not comply with the requisites of the 3 section of the act of 1793, calling for a correct description of the thing patented, (6 Pet., 247,) a new one may be issued on compliance with those requisites, which are there prescribed. But the new patent must be confined to the thing patented by the old one; the thing invented or discovered—"*the same invention*"—it cannot embrace

another substantive and essential matter, which was not before patented; the thing, the invention, must be the same in both patents; the only object in the renewal being to cure a defect in the description, not to supply the omission of an essential part of the invention; the new patent cannot be broader than the old one. If the thing patented is the same in both patents, its public use did not, under the former laws, amount to an abandonment, or such an acquiescence, as to affect the new patent on the ground of delay or negligence, in the assertion of the right of the patentee, from the date of the old patent, [to] its re-issue. But when an essential part is omitted, and the patentee suffers it to remain unpatented till it has come into public use, before the new patent issues, it will be subject to the same rules which apply to an original patent, making it incompetent to protect the patentee in his claim to such part in virtue of the patent re-issued, if it was not described in the one surrendered. The 13 section of the act of 1836, authorizes a new improvement, invented since the first patent, to be added in a renewed one; no law gives any authority to add an improvement, which had been invented by the patentee before the original grant; for it is not and cannot be any part of the description or specification of another distinct improvement. A patent for the combination of the parts of an old machine must show wherein such combination exists; what parts compose it; how they are combined in their action; if the description is defective, it may be corrected by a new one; the correction, however, must not extend beyond the combination of the parts first specified, as the introduction of other parts, not before specified, makes an entire new combination; consequently the thing patented becomes essentially different, being not the same invention, but a new one, made by a combination of a part not combined before, which might be a proper subject of an original patent, yet would not be authorized in a renewed one.

These are the tests, which the law applies to the description of the thing patented, in order to ascertain whether, in the words of the act of 1832, the old patent was "invalid or inoperative" by reason that the conditions of the former law not having been complied with, or in the language of the Supreme Court, the patent "is found to be incompetent to secure the reward which the law intended to confer on the (patentee) for his invention." In such case, the patent may be surrendered for re-issue, in order to correct the defects which invalidated the first, but the law expressly makes the new patent "in all respects liable to the same matter of objection and defence" as the old one, and imposes on the patentee the obligation "of compliance with the terms and conditions prescribed by the third section of the act of 1793." This is done by showing, according to its requisitions, what was the invention, the thing patented, by a designation of the invention principally,

made in fuller, clearer, and more exact terms than those used, so as to give it validity and effect, and secure the same invention, which is the only legitimate office of the renewed or re-issued patent. A specification consists of two parts—description and claim; the descriptive part is the explanation of the improvement in all the particulars required by the law; the claim or summary, at the close of the description or specification, is the declaration of the patentee of what he claims as his invention, by which he is bound so that he can claim nothing which is not included in the summary, and could disclaim nothing which was included in it till the passage of the act of 1837. But the summary may be referred to the description, and both will be liberally construed to ascertain what was claimed, and if the words will admit of it, both parts will be connected in order to carry into effect the true intention of the patentee, as it may appear on a judicial inspection of the whole specification. This makes it a question of law, what is the thing patented, depending not on the actual or supposed intention of the patentee, but the conclusion of the law on the language he has used to express it; a part of the description may be construed as a claim, and carried into the summary, and made a part of the thing patented, the effect of which is the same as if it was included in the summary in express terms. Cooper vs. Matheys, C. C. Mss. To authorize a recovery for the violation of a patent right, the plaintiff must show that he is the inventor of every thing he claims as new, that it is embraced in the patent, and that every thing so claimed and patented has been infringed by the defendant; thus, where the patent is for a particular combination of the parts of an old machine, and the defendant has not used the whole combination as specified in the description, and carried into the summary, the plaintiff cannot recover. Pranty et al. vs. Ruggles, S. C. 1842.

The court then proceeded to state the substance of the plaintiff's declaration, and referred to the patent of 1835, and the specification thereto attached, in order to ascertain the thing patented by that patent which was stated therefrom; they then enquired what was the thing patented in 1831, by referring to the evidence of Thomas P. Jones, contained in the deposition aforesaid, in connection with the journal of the Franklin Institute referred to by him. The court remarking that there being in evidence no copy of the patent of 1831, any drawing, or specification of the thing patented, or other proof of the contents of either than was contained in the deposition and journal aforesaid, then gave their opinion to the jury, that, on this evidence, the use of grooves was not claimed, and was no part of the thing patented in 1831 for turning short curves, but was a part of the thing patented in 1835. That it was an essential part of this invention, as Jones testified, and without which all the witnesses agreed that the invention was useless; as without the groove the cars would run off the road, and that the patent was not for

any parts of the machine which were new, but for a new combination of the old parts. It was then submitted to the jury, whether, on the evidence aforesaid, the omission of the groove in the patent of 1831 arose from inadvertence, and if it was done contrary to the advice of Jones, and in conformity with the opinion of the legal advisee of the plaintiff, and whether, without the groove, the description of the thing patented was sufficient, under the 3d section of the act of 1793, which was read and commented on by the court, who then proceeded as follows:

The Secretary of State is a ministerial officer, who must issue a patent if the requisites are performed.—6 Pet. 241. The question of inadvertence, or mistake, is a judicial one, which the Secretary cannot decide, nor those judicial questions on which the validity of the patent depends. He issues the patent without inquiry. The correct performance of all the preliminaries to the validity of the original patent, are always examinable in the court where the fact is brought.—6 Pet. 242, 6, 47.

In the application of the law to the evidence before you, the first inquiry is into the state of facts existing at the time of granting the patent of 1835; did they present a case for renewal, under the rules of law on which we have given you our instructions? Whether the original patent was invalid or inoperative, is more a question of law than fact, to be ascertained on a judicial inspection of the patent, specification, drawings, models, and the evidence of the contents; the court must construe all written evidence; but as depositions are considered merely as oral testimony, a jury must decide what parts are proved by them. The court must take as true the statements of witnesses as they are made, and lay down the law on the assumption of their credibility, and both court and jury must take an agreed or admitted uncontested state of facts to be their rule of action; a jury may deem a witness unworthy of credit, or not believe his statement, but ought to do neither without good cause. Whether the defects in the old patent arose from inadvertence or otherwise, is also a mixed question of law and fact, of law so far as depends on written, and of fact as to parol evidence; on this subject you have the evidence of Dr. Jones, who officially examined the old patent, &c., and made out the new, and we are mainly left to ascertain the facts in relation to both patents from him. In laying down the law to you we assume his verity in all he says, and taking his statement as proof of the facts there existing, our opinion is, that connected with the publication in the journal of the Franklin Institute, in 1832, when the matter was fresh in his recollection, and the specification in the new patent, the old one was invalid and inoperative, by reason of non-compliance with the requisites of the act of 1793. That it did not embrace the groove which was essential to its validity, that the new patent is not for the same invention, and that the plaintiff has not made out a case of such inadvertence, accident, or mistake, as justified the issue of the new pa-

tent, inasmuch as it appears from the patent for plates on railroads, issued at the same time with the one for short curves, that he had known and described the grooves.

It is for you to say whether you will take this evidence as we do; if you discredit, in whole or in part, you will find it accordingly.

Another important question arises in this case, on the construction of the 7 section of the act of 1839, taken in connection with former laws, which is, whether the plaintiff can sustain an action for the use of his invention, in the construction of his curves, before the granting of the patent of 1835.

This section provides, "That every person or corporation who "has, or shall have, purchased or constructed any newly invented "machine, manufacture, or composition of matter, prior to the ap- "plication by the inventor or discoverer for a patent, shall be held "to possess the right to use, and vend to others to be used, the "specific machine, manufacture, or composition, so made or pur- "chased, without liability therefor to the inventor, or any other "person interested in such invention; and no patent shall be held "to be invalid by reason of such purchase, sale, or use, prior to "the application for a patent as aforesaid, except on proof of aban- "donment of such invention to the public, or that such purchase, "sale, or prior use, has been for more than two years prior to such "application for a patent."

Tho' this act is retrospective in its effects on then existing patents, it is not void on that account; it was within the constitutional power of Congress to enact it as a rule for all cases to which its words and intentions apply, by its fair and legal interpretation, which we must ascertain by looking at the old law; the mischief and the remedy, which must be traced through the decisions of the Supreme Court; aad the acts of Congress on the same subject.

In 1808 an act was granted to Oliver Evans, renewing his patent which had expired by its own limitation; in the interval the defendant had constructed a machine of his invention, and continued to use it; after the new patent issued he was held liable, according to the words of the law, for such subsequent use, but the Supreme Court thus express their opinion of the case, had it rested on general principles: "The Legislature might have proceeded "still further, by providing a shield for persons standing in the sit- "uation of these defendants; it is believed that the reasonableness "of such a provision could have been questioned by no one, &c. "&c. The argument founded on the hardship of this, and similar "cases, would be entitled to great weight, if the words of this pro- "viso were *obscure* and open to construction."—9 Cr. 201, Evans vs. Lordore.

And thereupon the counsel for the plaintiff did then and there except to the aforesaid charge and opinion of the said court, and inasmuch as the said charge and opinion, so excepted to, do not appear upon the record:

The said counsel for the said plaintiff did then and there tender this bill of exceptions to the opinion of the said court, and requested the seals of the judges aforesaid should be put to the same, according to the form of the statute in such case made and provided. And thereupon the aforesaid judges, at the request of the said counsel for the plaintiff, did put their seals to this bill of exceptions, pursuant to the aforesaid statute in such case made and provided.

HENRY BALDWIN, [L. S.]
ARCH'D RANDALL. [L. S.]

STATE OF MARYLAND, *City of Baltimore, sct:*

Be it remembered, and it is hereby certified, that on this 29th day of October, in the year of our Lord one thousand eight hundred and thirty-eight, before the subscriber, a justice of the peace of the State of Maryland, in and for the city of Baltimore aforesaid, personally appears William Woodville, he being known to me to be the person so named, and deposes as follows, viz:

That previous to the 13th of October, 1830, the date of a communication from James Stimpson to Philip E. Thomas, esq., President of the Baltimore and Ohio Railroad Company, he was made acquainted with the invention by said Stimpson of the short curve for turning corners of streets by the application of the flanch on one side and tread on the other, and made the drawing contained herein, and wrote upon it what appears thereon, previous to the said 13th of October, 1830. And that although he was in the employ of the Baltimore and Ohio Railroad Company, frequently travelled the whole length of their road, and had frequent intercommunications with the officers and engineers of said company, from and after the 5th of April, 1830, he had not seen or heard of such a plan before said Stimpson's mention of his invention of the same to him.

Signed WILLIAM WOODVILLE.

Sworn to before me, a justice of the peace.

HENRY BRICE.

STATE OF MARYLAND, *Baltimore county, sct:*

I hereby certify, that Henry Brice, gentleman, before whom the above deposition was made, and who has thereto subscribed his name, was, at the time of so doing, a justice of the peace of the State aforesaid, in and for the city of Baltimore, duly commissioned and sworn.

In testimony whereof, I hereto subscribe my name, and affix the seal of Baltimore county court, this 29th day of October, 1838.

THOMAS KELL,
Clerk of Baltimore county court.

A cone of 3 inches diameter in a wheel of 30 inches will enable a carriage to pass without impinging on a curvature of 50 feet radius.

[See original for drawing, page 66.]

For an improvement in the mode of turning short curves on railroads, such as the corners of streets; James Stimpson, city of Baltimore, August 23.

37. The plan proposed is to make the extreme edges of the flanches flat, and of greater width than ordinary, and to construct the rails in such a manner that where a short turn is to be made, the extreme edge of the flanch shall rest upon it, instead of upon the tread of the wheel, thus increasing the effective diameter of the wheel in a degree equal to twice the projection of the flanch. The claim is made to "the application of the flanches of railroad carriage wheels to turn short curvatures upon railroads or tracks, particularly turning the corners of streets, wharves, crossing of tracks or roads, and passing over turnabouts," &c. Franklin Journal, vol. 9, p. 124.

On turning to pages 270 and 271, vol. iv, there will be found specifications of two patents granted to James Wright, of Columbia, Pennsylvania, for the mode of turning curves claimed by Mr. Stimpson. The only difference is, that Mr. Wright proposes to adopt his cars to several different curves by having three or more offsets in his wheels when necessary.

Paper B.

Franklin Journal, vol. 9, p. 125. "39. For an improvement in the mode of *forming and using cast or wrought iron plates, or rails, for railroad carriage wheels to run upon;* James Stimpson, city of Baltimore, Maryland, August 23, (1831.)

The claim in this case is to "the application of cast or wrought iron plates for the use of rail-ways on the streets or wharves of cities or elsewhere. The objects of said improvement being to employ rails that will not present any obstacles to the ordinary use of streets, or sustain injury therefrom, and so to form the plates at the intersections of streets or other crossings, that cars will readily pass over them, and also on circles of small radius."

The rails are to be formed with a groove in them to receive the flanches of the wheels; on one side of the groove, the width is to be sufficient for the tread of the wheel, on the other, it need not exceed three quarters of an inch. These rails are to be laid flush with the pavement of the streets. At corners to be turned, the rails are to be cast, or made of the proper curvature, one of them

only being provided with a groove, as the flanch is to run upon the other, upon the principle described in No. 37. Provision is to be made by scrapers, or brushes, preceding the carriages, to clear the grooves of dust, ice, and other obstructions."

Paper A.

Circuit Court of the U. S. eastern dist. of Pa. of Oct. sess. 1840.

JAMES STIMPSON,
vs.
THE MAYOR, ALDERMEN, and CITIZENS of Philadelphia. } No.

Interrogatories to be put to Dr. Thomas P. Jones of the city of Washington, by him to be answered upon oath or affirmation, the said Thomas P. Jones being a witness on the part of the defendant in the above case.

Interrogatory first. Are you acquainted with the improvement claimed by the plaintiff as his "in the mode of turning short curves on railroads" patented by him August 23, 1831, and repatented to him September 26, 1835? If so, was the said improvement prior to said 23d August, 1831, new? If discovered or invented by any other person prior to said date, state by whom, and in what, if any, public work, and all your knowledge therein?

Interrogatory second. Having first examined the description of the patent (English,) granted to William Henry James, dated 5th March, 1825, in the Repertory of Patent Inventions (Lond. in 1826,) vol. 2d. pp. 59, 60, and the description of the several American patents granted to James Wright, dated April 17, 1829, June 11, 1829, and September, 1829, in the Franklin Journal, (Journal of the Franklin Institute, vol. 4, new series, pp. 270, 1, 2, 3.) State if there are any differences in the improvement therein described, and the alleged improvement of the plaintiff referred to in the first interrogatory.

If there are any differences state what they are, and particularly if they are in principle and substance, or simply in the change of form and proportion, respectively. State fully.

Interrogatory third. State generally what have been the means of forming your judgment on questions relating to mechanics.

Interrogatory fourth. State your knowledge in relation to the burning of the Patent Office at Washington, if you have any, and at what date, what became of the original letters patent surrendered upon account of defective specification, and previous to said burning, to that office. Are the original letters patent of the plaintiff, of August 23, 1831, in existence, and if not, from what cause are they not in existence? State fully.

Interrogatory fifth. What are the contents of the specification of the alleged improvement of August 23, 1831? What are your means of knowing what were their contents? If you know them,

are they dissimilar or similar to those of the plaintiff's specification of September 26, 1835, a copy of which, marked A, is hereto annexed? If dissimilar, state in what particulars, and whether they are as to matters of form and substance, and particularly describe the difference if any. Answer fully.

Interrogatory sixth. Do you know any other matter or thing material to the defendants? If so, state it.

J. MILES,
C. OLMSTEAD,
Attorneys for defendants.

Cross Interrogatories.

1. Did you or did you not prepare the papers of the plaintiff when his patent for short curves was surrendered and renewed? What was the object of such surrender and renewal? Was it or was it not that the claim of running over or across tracks at right angles might not continue any longer to be incorporated in the same patent with the claim for short curves, as it had been theretofore?

2. Have you or have you not seen at any time "James' Patent," or "Wright's patent" applied to practical use? If you have, please to state when, where, and what opportunities you have had to see its operation.

3. In the use of the invention claimed in James' patent and Wright's patent, do the wheel run on the flanges, or on the treads? Are these grooves provided for in the tracks? Are not the angles extended or prolonged so as, by means of the wheels resting on unequal elevations, the conical principle is produced? Can the invention be used in the streets of cities which are paved, levelled and travelled by ordinary wheel carriages? If it can, please to explain the mode of operation in such places.

4. Do you know any thing further that may be material to the plaintiff? If so, please to state the same.

J. R. INGERSOLL, *for the plaintiff.*

April 5, 1841.

In the case of James Stimpson vs. the Mayor, &c., now pending, &c., I, Thomas P. Jones, of the city of Washington, D. C., do give the following answers to interrogatories put to me as a witness on the part of the defendants in the above case.

To the first interrogatory. I answer, that I am acquainted with the improvement "in the mode of turning short curves on railroads" patented by the plaintiff on 23d August, 1831, and re-issued under an amended specification, on 26th September, 1835. Whether the said improvement was new prior to the 23d August, 1831, is a question, the determination of which, in my opinion, is dependent upon the judgment formed of its similarity to, or identity with, the inventions referred to in the second interrogatory, namely, those of William Henry James and of James Wright.

To the second interrogatory. I answer, that I have examined the description of the patent granted in England to William Henry James, dated 5th March, 1825, and contained in the Repertory of Patent Inventions, and more fully in Newton's Journal, (London Journal of Arts and Sciences,) vol. 10, p. 301, first series, and also in vol. 4, Franklin Journal, 1st series, p. 317. That I have also examined that granted to James Wright, as contained in the Journal of the Franklin Institute, vol. 4, second series. That I have compared these with the alleged improvements of the plaintiff referred to in the first interrogatory, and that I have no hesitation in saying that so far as the turning of curves upon railroads is concerned, the principle upon which the turning is proposed to be carried into effect, is the same in each of the three plans, namely, the causing the wheel, which is to be run upon the outer rail or circle of the curve, to have its tread or bearing thereon, of larger diameter than that which bears upon the inner circle.

The difference in the three plans appears to me to consist in the following particulars. The wheels, as used by James, had each a double flanch embracing the rail on each side, and between flanches there were bearings, or treads of different diameters, upon either of which the wheel might be made to run by adapting the upper surface of the rail thereto. The rails upon which the tread or bearing of least diameter was to run having a rib, or projecting part, elevated to the proper height to adapt it to that part of the wheel which was to form the bearing or tread, by this means the same wheels might be adapted to curves of different radius. From the published descriptions of this plan above referred to, aided by engraved figures of it, it will be clearly seen that the parts referred to were to be arranged as above described.

In James Wright's car, the wheels were not to be furnished with double flanches, but each wheel had its flanch in the inner side, in the ordinary way. The tread of the wheel was so formed as to consist of a rim of two or more different diameters, the shoulders between which rims operated as flanches when the wheel was not running upon that tread which was towards the ordinary flanch, and which was necessarily that of the largest diameter. The rails, of course, were so constructed and arranged as to adapt them to that part of the wheel which was to bear upon them; the rail which was to bear upon a rim of smaller diameter being proportionably elevated.

In James Stimpson's plan, as described in the specification of his "improvement in the mode of turning short curves upon railroads," dated 26 September, 1835, a copy of which is annexed to the interrogatories propounded to me, the car wheels are to be of the ordinary kind, and when turning a curve one of the wheels is to run on its tread in the usual way, whilst the other is to run upon its flanch. In the rail upon which the tread is to bear, namely, the inner rail of the curve, there is to be a groove of such width

as to admit and receive the flanch, whilst the outer rail is to consist of a flat plate or of one containing a groove, which, from the nature of the case, must not be so deep as to prevent the flanch from bearing on the bottom of it. In practice, so far as my observation has gone, the flat rail without a groove has been used for the outer rail of the curve.

In answer to the question, whether the difference between the plans of James and of Wright, and that of the plaintiff's, is substantial, or consists simply of a change of form and proportions, I reply, that so far as the turning of curves "round the corners of streets, wharves, &c," is concerned, I do consider the plan of the plaintiff and the others above named to be substantial, and not a mere change of form. Neither the plan of James, nor of Wright, as they are presented in the documents referred to, could be admitted for use in the streets of town or cities, as they would constitute obstructions as great as that which would be presented by the ordinary rails used on railroads. Altho' the same general principle of operation obtains in the three plans, there does appear to me to be a special adaption of this principle to the turning of short curves in streets, as the same is described in the specification of the plaintiff.

To the third inter. I answer, that my pursuits through life, and my consequent associations, have been such, as to render me familiar with the subjects of mechanics in general, both theoretically and practically. I have been engaged in business as a practical mechanician, have been a professor of mechanical philosophy and of mechanics, and a public lecturer on these subjects; have been editor of the Journal of the Franklin Institute, from 1826 up to the present time; have written and published much relating to the progress of the useful arts, both mechanical and chemical; and have been, and am, referred to almost daily, for my opinion and advice, by practical mechanics and manufacturers.

To the fourth interr. I answer, that the Patent Office at Washington was burnt on the 15th December, 1836; that my dwelling was immediately opposite to that building, and that knowing where its most valuable papers were deposited, I attempted to enter the office for the purpose of saving them, but was unable so to do, and that I know that every paper and document contained in it was destroyed. The original letters patent of the plaintiff, which had been surrendered for the purpose of being re-issued on an amended specification, and which had been granted on the 23d August, 1831, were of course in the Patent Office at the time of the fire, and shared in the general destruction. This I know, not only from my acquaintance with the practice of the office, but from a recollection of the actual surrender of the patent in question.

To the 5th int. I answer, that the plaintiff exhibited to me the specification in question, previously to his filing the same in the Patent Office; as he likewise did at the same time the specifica-

tion of a patent for "forming and using cast iron plates or rails for railroad carriage wheels to run upon," which last patent is noticed on page 125, vol. 9, second series of the Journal of the Franklin Institute. I then examined them cursorily, and expressed an opinion, that the improvements described in the two specifications might have been embraced in one, and that it would have been better to have pursued that course. The specification of the mode of turning short curves appeared to me incomplete; an essential feature of it being contained in that for "forming and using cast iron plates, &c." The papers however remained as drawn up by Mr. Stimpson's legal adviser, and when the patents were subsequently surrendered in 1835, it was thought best to preserve the division into two; it was probably in fact necessary, to pursue this course, as I am not aware of any precedent for uniting two patents into one, although one may be divided into two or more.

Nearly ten years have elapsed since I first saw the specifications upon which these patents were first issued, and nearly six years since I last read them; and my recollection of them extends to certain prominent points only. The claim under the patent for turning short curves, as given in vol. 9, p. 124 of my journal is, I have no doubt, literally correct. There has been an omission in the printing of inverted commas ["] after the word "turnabout, &c." In this specification it was proposed to make the extreme edges of the flanches flat, and of greater width than ordinary; this however did not enter into theclaim, and it is not probable that I should have recollected the fact, had it not been noted in my journal, or called up by some other collateral circumstance. The main defect in my judgment of the original specifiation, in the patent for turning short curves, was the omission of the mention of the groove in the inner rail. I believe, however, that it was alluded to *to* in this specification, but the description of it was contained principally, if not wholly, in the specification of the patent for "forming and using cast iron on wrought plates, &c." above noticed; as may be inferred from a reference to my journal, vol. 9, p. 125, patent 39.

To the 6th int. I answer, that I do not know of any other matter or thing material to the defendant.

To the first cross interr'y. I answer, that I did prepare the papers of the plaintiff when his patent for short curves turning short curves was surrendered for re-issue; that the object of such surrender and renewal was to limit and confine it to the turning short curves in streets, &c., by leaving out certain matters in it respecting the crossing of tracks or roads, and the passing over turnabouts; and to define the subject matter of the patent more clearly, without its being necessary to refer to that simultaneously obtained for "forming and using cast or wrought iron plates, &c."

To the 2nd X int'y. I answer, that I have never known or seen

"James' patent," or "Wright's patent," being applied to practical use; nor do I believe that it was ever done with either of them.

To the 3d X int. I answer, that neither in the plan patented by James, nor that patented by Wright, were the wheels in any case to run on their flanches. Flanches were used in both, and also treads of different diameters, and the wheels were to run upon one or the other of the latter; neither of them contemplated the use of grooves on the tracks. I do not see any reason for prolonging the angles to enable the wheels to rest upon unequal elevations, so as to bring the conical princip*al* into operation; this was dependent upon the forming of treads upon the wheels of unequal diameters and providing rails adapted thereto, by their unequal elevation. In my answer to the second direct interrogatory, I have fully expressed my opinion, that the plans of James and of Wright, were neither of them adapted to, or admissible in, the streets of towns or cities.

To the 4th X int. I answer, that I do not know of any thing further, that is material in the case.

Short curves.

23 Aug., 1831.—Renewed 26 Sep., 1835.

To all whom these presents shall come: Be it known, that I, James Stimpson, of the city and county of Baltimore, and State of Maryland, have invented a new and useful improvement in the mode of turning short curves upon railroads, with railroad carriages, particularly those round the corners of streets, wharves, &c., and that the following is a full and clear description of said improvement or invention, as invented or improved by me, viz: I use or apply the common peripheries of the flanches of the wheels for the aforesaid purpose, in the following manner: I lay a flat rail, which, however, may be grooved, if preferred, at the commencement of the curvatures, and in a position to be centrally under the flanches of the wheels, upon the outer track of the circle, so that no other part of the wheels, which run upon the outer circle of the track rails, shall touch or bear upon the rails but the peripheries of the flanches, they bearing the whole weight of the load and carriages, while the opposite wheels, which run upon the inner track of the circle, are to be run and bear upon their treads in the usual way, and their flanches run freely in a groove or channel; which treads are ordinarily about three inches in diameter less than the peripheries of the flanches. Were the bearing surfaces of the wheels, which are in contact with the rails while thus turning the curve, to be connected by straight lines from every point, there would thus be formed the frustrum of two cones, (if there be four wheels and two axles to the carriage,) or if but one axle and two wheels, then but one cone; which frustrums, or the wheels representing their extremities, will, if the wheels are thirty inches in diameter, and are coupled about three feet six inches apart, turn a

curve of about sixty feet radius of the inner tract rail. The difference in diameter between the flanches and treads before stated, the tracks of the usual width, and the wheels coupled as stated, would turn a curve of somewhat smaller radius, if the axles were not confined to the carriage in a parallel position with each other; but this being generally deemed necessary, the wheels run upon lines of tangents, and those upon the inner track being as wide apart in the coupling as the outer ones, keep constantly inclining the carriage outwards, and thus cause the carriage to tend to run upon a larger circle than the difference in diameter of the treads and flanches would otherwise give; but the depth of the flanches and the coupling may be so varied as to turn any other radius of a circle desired. What I claim as my invention or improvement is, the application of the flanches of the wheels on one side of railroad carriages, and of the treads of the wheels on the other side, to turn curves upon railways—particularly such as turning corners of streets, wharves, &c., in cities and elsewhere—operating upon the principles herein set forth.

(Signed) JAMES STIMPSON.

Witnesses:—JAMES H. STIMPSON,
GEO. C. PENNIMAN.

James' patented improvements in railways and locomotive carriages.

It has, we believe, been a generally received opinion, that carriages on a railway cannot be propelled by locomotive power up an inclined plane, that rises more than twenty feet in a mile, without the assistance of indented or toothed rails to increase the resistance, and thus prevent the carriages from slipping back. By Mr. James' new improvements, this difficulty is, however, so completely overcome, that a train of carriages may now be made by a locomotive engine to ascend and descend incline planes, of any elevation necessary in the construction of railroads, and over very smooth and almost polished surfaces. We understand that the most satisfactory proofs have been afforded of the ability to effect this, by repeated trials on a railroad more than a hundred feet in length, laid down for the purpose of experiment; on which it was found that a train of carriages would, with the patentee's improved machinery, ascend inclined planes of 3 inches in the yard, which is equal to 440 feet in the mile. This important advantage is gained by applying the power to the axle-trees of the wheels of the several carriages in the train, by means of the rotation of a long horizontal rod, (or series of connected rods,) actuated by bevel gears under each carriage.

The other improvements are for enabling the carriages on a railway to pass around turns or curves in the road without additional friction. For this purpose, the horizontal rotatory shafts which cause each pair of wheels in the train to revolve and propel the carriages forward, are connected together by a novel and very in-

genious kind of universal joint, which communicates the rotatory motion to each successive carriage, even if so placed on the curves of the roads, that the side of one carriage shall present to the side of the next an angle of 30 degrees. To cause the carriage wheels to run round the curves of the railway, without the usual destructive rubbing of their surfaces, the rails in those parts are made with several ribs or elevations, and the wheels of the carriages are consequently formed to correspond with these ribs, by their peripheries being grooved in like manner, so that a wheel, in effect, possesses as many diameters as there are variations in the surface of its periphery, by which means it may be made to travel faster or slower as may be desired.

Specification of a patent for an improvement in the railroad, and a car adapted to run thereon, by means of which, roads, either curved or straight, are passed with equal facility, granted to James Wright, Columbia, Lancaster county, Pennsylvania, April 17, 1829.

The improvement in the car consists in the construction of the wheels, which are so formed, that each wheel has two, three, or more rims of different diameters, with shoulders which serve as flanches, to keep the wheel upon the rail. The number of rims will depend upon the number of different curves in the different parts of the road. Where the curves are all of the same radius, two rims only will be required to each wheel. When the car or carriage runs upon a straight road, rims of equal diameters run upon the rails; when upon a curved road, the diameters of the rims employed are to each other as the radii of the inner and the outer rails.

When the carriage leaves a curved for a straight road, a straight road for a curved road, or one curve for another, the rails, at their places of meeting, do not form a continued line, nor are they on the same plane; a lateral offset being made, so that the rims of the proper diameters may take upon the new section, either straight or curved, upon which they are to pass. The difference in the elevation of the rails is also made to correspond with the difference in the diameters of the rims, so that the wheels pass from one rail to another without any jolt or variation in the horizontal position of their axes.

What I claim as new, is the whole of the arrangement herein described, by which the rims of different diameters, upon the same wheel, are adapted to pass upon rails either straight or of different curvatures, and the laying of the rails in the manner described, so as to correspond with the structure of the wheels, without regard to the manner in which the carriage or the road is formed in other respects.

JAMES WRIGHT.

Specification of a patent for an improvement on the railroad, by which a railway carriage may be made to turn out and in at the places intended for that purpose, on a single railway; or to pass from one track to the other, where the road is double, which mode obviates the difficulties heretofore experienced in effecting this object. Granted to James Wright, Columbia, Lancaster county, Pennsylvania, June 11, 1829.

The rail road carriage which I use, and the kind of rail upon which it runs, are fully described in the specification which I deposited in the Patent Office of the United States, and for which letters patent were granted unto me, bearing date the seventeenth day of April, one thousand eight hundred and twenty-nine, to which instrument, with the drawings which accompany the same, reference may be had for the purpose of more clearly understanding the addition to a[n] improvement upon the same, which I am now about to describe.

For the purpose of rendering this description clear, I deem it best to refer throughout to the accompanying drawings; that marked fig. 2, plate 3, representing a single track, with its turning out place, and that marked fig. 3, a double track, with the rails for passing from one to the other. In each of these drawings the same letters refer to corresponding parts. The rails marked A A, are those upon which the rims of the wheels run, which are of the larger diameter, and are, therefore, those which have the lesser elevation; those marked B B, and which are shaded, are the more elevated rails, upon which the rims run that are of the smaller diameter. Those parts C C, that are left blank at the junction of the rails, are openings for the passage of the flanches of the wheels; these openings will not be of such a width as to present any sensible obstruction in the passage of wheels over them.

It may sometimes be found useful, and I intend sometimes to apply, a small thin piece of curved rail of wrought iron or other material, at the commencement of the turn out, which, when in its place shall raise the higher rail sufficiently to prevent the larger rim from touching the lower rail, and which will necessarily have the effect of compelling the car to follow the curve; when this is out of its place, the rim of the smaller diameter will not touch the higher rail, and the car will consequently proceed straight forward. Pieces so used may be fixed upon a pivot or hinge, in a way so simple that it is unnecessary to describe it.

It will be seen by inspection that the higher rail does not, in any instance, cross the main road, but only occupies the space between the two roads or tracks, or form one of the rails of the turn-out on the single track, and that the space for the flanch to pass is always in the lower rail.

By the adoption of the foregoing plan much of the expense heretofore encountered in constructing turn-out places will be

avoided, as the distance to which they must extend will be very considerably decreased.

Any friction wheel, applicable to rail-way carriages of any other construction, may be applied to my carriage, constructed to operate on a straight or curved road. What I claim as my own invention in the above described plan, is the whole arrangement of the rails of greater or less elevation, to my rail road carriage, each wheel of which has rims of different diameters, so as to effect the purpose of turning out, and in, upon a rail road.

Signed, JAMES WRIGHT.

Specification of a patent for a new and improved mode of causing railway carriages to run with equal facility on a straight or curved roads; denominated the self-adapting railway carriage or car. Granted to James Wright, Columbia, Lancaster county, Pennsylvania, September 10.

Be it known, that I, James Wright, of Columbia, in the county of Lancaster, and State of Pennsylvania, have invented a new and improved mode of causing railway carriages to run with equal facility upon straight or curved roads; which carriage or car, so constructed, I denominate the *self-adapting railway carriage* or *car*, and that the following is a full and exact description of my said improvement. The wheels are firmly fixed upon the axles of the carriage; the axles turning in suitable boxes, or against friction wheels, constructed in any of the modes already known. The bearings in which the axles run, are attached to the frame work of the carriage by a bolt or pin in their centres, in order to admit of such a degree of motion or vibration on these centres, as shall allow of the fore and hind wheels, adapting themselves to the curvature of a road, by their planes forming a tangent to the curve of a rail upon which they are to run. The wheels have each one flanch, and their edges, which run upon the rail, are in the form of the frustrum of a cone, the flanch being upon the side of the largest diameter, which usually stands within the rail, but it may be placed on the outside, without in any way varying the principle upon which it is to operate. The angle which the edge of the wheel forms with its plane, may admit of considerable variation, and may be governed by the radius of the smallest curvature over which the carriage is to pass; as, for example, should the curvature be upon a radius of three hundred feet, the angle will vary more from ninety degrees than would be necessary for a curvature of six hundred feet. In every case the obliquity must be such, that in running upon the rails a circumference shall be found upon the conical surfaces of the wheels, which shall adapt them to the running without friction upon each of the curved rails.

The kind of rail, which I would prefer as best adapted to my improved carriage, is the round topped rails; but any of the rails in ordinary use may be employed.

When a carriage, constructed in the manner above described, is placed upon a rail road, it will be found that it has a tendency to adjust itself, and actually will adjust itself, so as to give to the wheels the positions necessary for running upon a road either straight or curved, with no other than the ordinary rolling friction.

What I claim as new, and for which I ask an exclusive privilege, is the conical form of the edges of the wheels, and the vibratory motion of the axle, to allow of the wheels adapting themselves to the curvature of the rails.

Where in any particular part of a road it is desired to turn upon a smaller curve than might be thought convenient by the foregoing plan, the addition of a rim may be made to the wheels to operate upon an elevated rail, upon the principle described by me in the specification of a rail-way and cars to run thereon, for which a patent was granted to me on the 17th day of April, 1829.

JAMES WRIGHT.

In the annexed drawing, fig. 1 represents the plan of the carriage, and fig. 2 the connexion of the axle with the carriage, by means of a pin through its frame, in which the axle turns. Between the two frames friction wheels or rollers may be placed to sustain the load, and allow the axle to vibrate freely.

(For figures see original, p. 89.)

PHILIP E. THOMAS, Esq.,
President of the Baltimore and Ohio R. R. Company.

BALTIMORE, 13*th October*, 1830.

SIR: Having devoted a portion of my time for the last two years to the consideration of railroads, their necessary appendages, construction, and means of construction, locations, &c., and having had several conversations during the course of last winter with different individuals, upon the propriety and feasibility of continuing your road through the city, at least in an inward and outward track, and finding considerable feeling excited in the minds of many, for and against its introduction through the streets; those against it on the presumption that it would injure their individual property, supposing it must necessarily impose many obstructions to the safe and usual intercourse and travel in said streets; obstructing the passage to their dwellings and stores; also, create great noise and confusion, and to that degree that they should feel themselves completely despoiled of their property, and that its introduction into the city must be viewed as a great calamity; while others held a different

opinion. I could not for my own part see any just reasons for not joining the latter. Having had but a short residence in the city, possessing no real estate in any part of it, nor stock in the road, I thought I could trust to the impartiality of my judgment upon the subject, so far, at least, as its advantages or disadvantages may exist; and I was led thereupon to give the subject a pretty general survey, both as to the means of its introduction, and its causing the least inconvenience to the citizens after its completion; and, also, while it was under construction. I also took into close consideration the natural and local interests of all sections of the city, compared with the public interest, the means of the company, and the city corporation, to effect a general diffusion of the road all over the city, or partially so; what the right of the citizens, and the duty of the corporation were in relation to them, and to your company; and I must confess that the advantages that must accrue to the citizens, and to all concerned in it, appear to me so vastly to outweigh all possible real objections, that I should suppose it could not admit of a moment's hesitation.

I have had a tolerable opportunity to observe the effects of the lucrative and active business of a city, being crowded into a small part of it, or of its being generally diffused, and upon the general interest, convenience, wealth, and harmony of the citizens, under different circumstances; and I am well satisfied from those observations, that the more business is scattered, the broader the surface over which it is transacted, the greater is the wealth of that place. There are fewer paupers, and more harmony and good will among the whole. I therefore conceive it to be the imperious duty of all city corporations to keep it as a great object in the scope of their policy, so to extend, as much as is in their power, the general benefits of roads, canals, railroads, or any general inlet to a city, that as many of the inhabitants shall have it in their power to avail themselves of its advantages as is possible, consistently with the public abilities. And to illustrate some of these points by living examples, I would beg leave to refer to Boston, in Massachusetts. When State street, Long wharf, and Cornhill, engrossed all the trading business, the real value of the aggiegate, taxable, real estate property of Boston, was not more than two-thirds of what it was, after India wharf, Central wharf, Broad, Central, Brattle, Market, and the New Market streets, with the extension of improvements to the east of Mill creek, were rebuilt, (independent of their real cost, private dwellings are generally valuable in proportion to their proximity to business,) and although there were no more inhabitants or business after than before those improvements, yet the property adjacent to those improvements, to a great extent, was doubled in value, a considerable part of which was before almost valueless. In New York, about two wards of that immense city engross nearly all the lucrative business. Observe the confusion where the business is done, the immense disproportion of the value of real estate out of, com-

pared to that within, its range. The chief cause of all this huddling is brought about by the auctions having engrossed so large a proportion of the business of that city. The effect upon the value is the same as to have all the business of the city crowded into one street. Some single auction establishments transact sufficient in amount, to maintain at least fifty respectable commercial houses; hence the immense number of lookers on, and the vacant houses in the upper parts of the city. In Philadelphia you find a general diffusion of business, equalization of the value of property, dwellings occupied to the remotest improvements, no confusion, no jealousy of each other, harmony and quiet reign in this fine and well organized city, as in the open country; in short, this city of cities, I have no doubt, contains as many or more inhabitants than New York, although its local advantages will in no way compare with it.

After these brief and imperfect remarks upon the effects of extension of business in a community, I would call your attention to Baltimore, and in looking upon it as at present built up, it presents a very extensive water front, capable of immense commercial operations; it is also very convenient in almost every respect. In the rear of the whole extent of this front is elevated ground, highly eligible for buildings, necessary for the private dwellings of a very extensive commercial city, which of itself is of great consideration, for should its value be pretty uniformly increased, it would naturally harmonize the inhabitants; each would feel that he had an important interest in what was doing, and an equal rise in value, upon an extensive surface, would be far more valuable to the city, as a city, than if the same advance were made on a small section of it. Perhaps you may say that you, as a company, have nothing to [do] with the particular interests of the city; but in my view every thing should be considered, upon the broad scale of combining every possible interest, to the remotest grade, that can be made of use to individuals and to the whole community, and that your railroad should be considered as a river of the first magnitude, collecting the resources and wealth of millions, to be distributed to the remotest parts of the earth, which river discharges into a fine safe harbor, and thence to the ocean, free from every danger. But if, on the other hand, you stop it out of the city, or carry it to only one depot in it, and that to as near a point to the present location as you can, then you may consider your river as choaked up by bars, shoals, rocks, and dangers, which will nearly preclude navigation from its entrance, and in consequence the river be dwindled into a mere creek, or interior convenience. To be fully understood, every expense and especially overcharge upon the transit of property from the country to its final destination, is a check upon trade, and will re-act upon the interests of the company. Other channels will be sought out, and in time the company and city will lose an immense income from not providing against it in season. Therefore, extend the road the whole length of the city, let all have a fair chance to

seize upon its benefits, and their influence and enterprise will be a sure guarantee for your interests.

I am aware that, in all new undertakings, the liability to err is great, for it is not in the power of man, when beholding an object, however admirable in its appearance, or improved in its construction, to say that it is perfect; every day's experience teaches the contrary. Hence the precaution before breaking up the streets, and the preparation of materials (above all the timidity and caution any one should feel when offering any propositions) in projects, when there have been no opportunities of practice; and all that I presume to offer is under these considerations. That they are not infallible I admit, but as it may be possible that some one hint, with the many more able ones which may be offered from others, may be useful in your great and (in my humble opinion for the present and future generations) invaluable undertaking, to be instrumental, in the smallest degree, in the erection of so useful and splendid an object, is of itself my ample reward.

How, then, is this great desideratum of its entrance into the city to be effected with the least inconvenience in the streets, and the greatest benefit to the citizens, community, and company, except by extending the road from west to east, as far as public or individual locations require it? A water front possesses advantages for business, which the rear never can; and should it be attempted to divert it from its natural course, it would be arbitrary, and eventuate in a mere speculation. In this view of the case, I consider that Pratt and some other streets are, and must naturally, for some time at least, be the business streets; that is, the kind of business that is done off the wharves. And from the width, extent, and easy descent of Pratt street from your present depot to Jones's Falls, and east of them, there can be no reasonable objection to its coming in on Pratt street, and branching, going and returning on other streets. A single tract upon each, in the centre; that is, coming in on Pratt with the products of the country, on tracks leading down that street, and branching to other business streets, and round the end of the wharves, where there is room and business calls, would accommodate the present trade, take up the heavy goods while at the wharves which may there offer, and return through any of the cross streets, except, perhaps, Light and Calvert, whose declivity is too great, to Baltimore street; then take on the lighter goods, which should lay on the top of the loads, and pass out through said street to the depot. To go any further north I think it would be superfluous, and would be an unnecessary expense to go where business is not established, and which no one would be compensated for, until the citizens call for it; and it would be consistent with their rights and interests, and the duty of the city corporation and your company, to grant the citizens an extension of the railroad when they call for it, as their business and customers might otherwise be drawn off to some other section of the city, and leave their stores, which are

unfit for dwellings, a useless property upon their hands; and the State might also be a loser of many thousands of dollars in the article of flour, in the loss of the Howard street brand, celebrated over the whole globe, a ready sale, at considerable advance over other brands, without trouble, from its name; a name which, in no sense, should ever be lost sight of. And as the articles of coal, stone, lime, timber, and lumber, would be an improper incumbrance in passing through the streets, a branch from your present track, leading down the Patapsco to deep water, would also be of much importance. The land is now generally unimproved; the route and ground for a depot, no doubt, might be obtained at a very reasonable rate. When the nature of these articles is properly considered, and that it would be highly improper to pass them through the streets any considerable distance, and the necessary room they must occupy, the sooner a location is procured the better for the company and the community. To have two tracks in one street, would inevitably incommode the usual business of the street too much. To have but one track to travel both ways upon, would also be a great inconvenience; the passing of cars would be too constant, and those receiving property would also be too much hurried in their transactions. One would constantly be in the other's way, and it would, as before observed, afford but a partial diffusion of the business, and the company would be compelled to have many more hands to assist in the safe and correct operation in the discharge and collection of goods, than with an in and an out track. The necessary turn-outs would finally lengthen the distance, as much as to make two entire tracks, and the citizens would realize less benefit and more inconvenience than with two. I also consider turnabouts in the streets as being altogether out of the question. The difficulty in keeping them free in winter; the liability of their frightening the horses in passing over them; the blocking up of the street in the process of turning a train of cars; the necessity of disconnecting the latter, the horses being left loose while the operation is going on unless there be two drivers, or the horse taken out and tied to the car or some other object; all which would subject the transit to too much trouble and delay. Then the grand consideration is, what kind of road, material, and mode of laying down, and where? What will present the least objections, and the greatest usefulness? That which presents itself to my mind for cheapness and convenience, in all its bearings, and facility in laying down, and ease of being taken up, for street purposes, is wood sleepers, bedded in the earth according to the present regular grading of the streets, except where they could be improved by levelling, without injury to the streets; said sleepers to be in size six by four inches, or more or less, in thickness, lying flatwise, solid upon the ground, the top of which to be about two and a half inches below the upper points of the paving stones, and that to be covered with a cast iron plate five inches and three quarters wide, two inches deep, but so shaped as

to be but about half an inch thick in the whole, more or less; the part on which the wheel runs should be as wide as the whole tread of the wheel, so as effectually to protect it from the paving stones; a groove or gutter, one and a half inches wide, and the same in depth for the flange to run in, the side of which to be as high as the part on which the wheel runs. This will cover the wood, and the paving stones may be driven up tight to each side of it, which will preclude the necessity of cross sleepers, and, I believe, prevent any bad effects from frost. The castings should not exceed three to four feet in length, with two or three spike holes in each, (longer ones would subject to more loss in replacing them when broken,) and so joined to each other that one might be replaced without disturbing the adjoining ones, and yet so formed that, when in place, one would secure the other laterally. This kind of rail embraces advantages for street use which are worth consideration; facility in laying down, an uniformity in the groove, the ease of freeing it from ice, dirt, &c., when choked up in winter, by passing a pair of wheels in front of a loaded car, the flanges of which to be made like saw teeth, or spurs, of sufficient weight to cut up the ice; a scraper, if found necessary, to follow, surmounted with a double mould-board like plough, would clear it all out, and leave it at a distance from it without trouble or loss of time. Stone rails, unless two iron plates were fastened upon the top to secure the groove for the flange, I think would not answer, as they would soon crumble out, and admit gig and other wheels to drop in, and in the end produce bad effects to both; and if two plates should prove necessary, it would also be requisite to cut the groove in, or near, the middle of the stone, which would be tedious; and it would be still more difficult and expensive to form the curves with them, as they must be turned by the flange of the wheel running upon the bottom of the groove in the outer rail, and, as the wheels are now made, they will turn on a curve, commencing from the track laid in the centre of the street, passing within one or two feet of the corner of the curb stones bounding the edge of the side walk. The wheels should be made to turn off of the straight track into the curves, by laying down a short piece of iron, which should be on board of the car for the purpose, to answer as a switch, and then taken up again.

It would be necessary to have cast iron trunks to pass off the street water under the tracks, or at least cast iron covers, as they would occupy so little space as not to obstruct the water; in top of which the grooves for the flange of the wheel should be cast. Where there is *no railroad* in the streets, and there is considerable travel, those trunks are well worth consideration, as the gutters are a great annoyance. A mile of this kind of road in the city, would not exceed seven to eight thousand dollars in cost.

I would therefore extend the road from the present depot, through Pratt street, to the city block; thence round the point, as near as

possible to the heads of the wharves, and below the point, when the extension of the settlements called for it, and return through some streets convenient for being graded, so as to be connected all the way, where practicable, through the cross streets, and join the two ends to each other. This would convert the whole front of the city into stores, if necessary. Capitalists would immediately seize upon the property for that purpose; and this would be the means of introducing strangers from all parts of the continent with capital to be employed in trade and navigation. Lines of packets would be immediately established between this and Europe for the supply of foreign goods. Southern and Western traders would no doubt find it more to their advantage to trade here than at New York; the increased trade, foreign and domestic, with the addition made to our citizens, would afford double the business for dray and other working men, and trades of every description would be very materially advanced; and when the road shall be constructed, as it may be, it will be found not in the least obstructive to the usual business of the streets, but an absolute improvement. The passage of cars will rather afford real pleasure and amusement to the dwellers in the streets, through which they may pass, than otherwise. I am *a* confident that a train of three cars would in nowise produce the noise, or annoyance, to the citizens, that a single dray does; and yet it would require about fifteen drays, to pass twice through the streets, to convey the same goods contained in the three cars. It cannot be supposed that engines, or locomotives of any kind, should enter the populous part of the city, but stop out of the depot. Horses, with but two or three cars, so that the drivers could by means of the breaks have perfect command over them to be able to stop at pleasure, should only be allowed to pass at a moderate speed, and be regulated by the city authorities. This would secure ample safety in all respects, and they might (except from the novelty) pass totally unheeded. The engineers would require the time, while the cars were absent, to refit and oil up for a new start.

This, or some similar arrangement, would effectually secure and accommodate all parties. I have had made a small model representing the crossing of two streets, with rails laid in the centre of each, with a turn round one corner, and showing the wood and iron rail, water trunks, &c., which is at my house, No. 49, Albemarle street, entirely at your service.

Having received at your hands much accommodation in the use of your road for trials of my horse car during the last season, I take this opportunity to express to you my thanks and gratitude; and, also, to the directors and managers in general, all of whom have favored me with their kind and disinterested assistance in my experiments.

I sincerely hope that nothing may hereafter occur to retard the